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FORESTRY ON THE COUNTRY ESTATE

By WARREN H. MILLER.

I. THE WOODLOT.

IN almost every newly purchased country place there is considerable wooded area and rocky ground, the woodlot and stony pasture of the erstwhile farm. The new owner looks them over in some perplexity. He had set out to plan his estate with an eye to aesthetic beauty, to surround himself with pleasing vistas, rolling swales of green things growing, live stock and buildings that would be a pride and pleasure to the eye; but here are some thirty or forty acres of "just woods," with perhaps a brook, for the most part brush and thicket, and, as for the stony pasture he sees a debit of a good many hundred dollars spent on stoning it before it will ever be ready for the plow. In fact an eye-sore of several acres of stony ground has often been the deterrent to the purchaser of an abandoned farm having otherwise excellent possibilities.

Yet the exercise of a little practical forestry, such as every country gentleman should be reasonably conversant with, would cover the stony pasture with thriving trees at far less expense than stoning, and transform the brushy woodlot into a noble forest that will be a favorite place in your walks in the cool of the evening when the thrushes are singing.

Forestry does not mean, as popularly supposed, a mere knowledge of the various tree species plus a familiarity with mensuration and log scaling. It goes far beyond that. It is the science of handling large masses of trees, of securing their reproduction in the same

species over vast areas, of protecting them from fire and insects, of seedling, nursery and planting operations done on a scale of millions of trees. Not only must the forester be familiar with the identifying characteristics of our forest tree species but he must know what soil base a given tree prefers, what its climatic requirements are, what rain supply it thrives best under, the years a stand takes to reach maturity, the strength and value of its timber, the disposal of its by-products and thinnings, its autumn coloration, date and duration of spring flowering, seed distribution—a thousand details which act and react in the busy life of a forest of growing trees. It is a fascinating profession, and one that will appeal strongly to our youths of the future, a profession that will be a long while becoming crowded, for our State and national forest services are destined to be the greatest of all our Government enterprises and can at present use every graduate of our forest schools.

But the country gentleman requires no such formidable array of scientific attainments as does the trained forester in order to practice the simple operations of making a forest of his woodlot and reclaiming his stony pasture. Let us assume at the outset that he already has all the arable land that he can manage; that the correct balance of plant and animal life has been already seen to or planned for; that the land to be devoted to forestry will give its very best commercial yield when so treated. While it is well to combine the aesthet-



MAKING A NOBLE GROVE OUT OF THE ERSTWHILE WOODLOT.

ic with the practical in running your country place, let us not lose sight of the dollar in our desire for beauty; and do not for a moment assume that forestry is in any sense a non-paying aesthetic luxury. It is the most practical thing you can do.

I know of no more pleasurable art than the amelioration of the prosaic farm woodlot. By the judicious use of the axe and the planted tree it can be made a forest of surpassing beauty, an abode for birds and wild things; a place of vistas, of cool shady ravines where the silvery sheen of balsams and the feathery fronds of hemlocks contrast with the glowing greens of oaks and maples; of clean open groves, where towering shagbarks and tulip trees and sweet gums raise their green canopy far overhead and the forest floor beneath is cool and sweet and grassy and there are wood lilies about.

A touch of the axe here and there, a restoration by replanting of the trees that nature originally grew in profusion, above all a fine sense of what to take

and what to leave, a knowledge of where to look for features which may be wrought into points of beauty—these are the brain tools that you must bring to the abandoned woodlot.

A knowledge of what to leave is your first essential. Here is a pig-nut hickory, recognizable by its seven-leaflet leaf and its small thin-shelled, bitter hickory nut. The farmer will tell you that it is worthless and had better be marked for firewood—but not so the forester. In the autumn that tree will be a flaming shaft of pure pale yellow and if it is in a position where it can be featured (and it usually manages to grow in just such a position) you had best save it. Again: we are thinning a clump of maples in order that the dominant ones may become large and fine. Which shall be marked? Look well then to their leaves; this one's a soft maple, its feathery leaf betrays it; away with it and give the sugar maples a chance! There is a red maple, identified by its round-based, toothed leaf. Shall we mark it for the axe? Not so



WHITE PINE AND RED SPRUCE ON THE LAKE ISLANDS.

fast, for on these high dry ridges, growing in company with the sugar maples, the red maple puts on the most amazing solid dark reds imaginable in the fall, and it is sure to be a landscape feature. Better take these two spindly sugar maples instead. Again: suppose you find a few ash trees in the woodlot. Why are there not more of them, and will it be safe to take any of them without risking their total disappearance?

You will observe that a knowledge of the tree species is one of the essentials for the practice of intelligent woodlot forestry; not merely their identification characteristics but what each species is valuable for commercially and aesthetically, what soils it prefers, how much moisture it needs.

There are not very many species grown by nature in any one forest. I once made for my good friend, Prof. Hickel, of Versailles, France, a collection of American tree seeds from the forest of Interlaken, where I live. There were thirty-two species represented, not such a very great number to become acquainted with if you are going to make something of your woodlot, for these are the materials with which you must work. You should know the five pines, four spruces, seven oaks, four maples, four hickories, four birches, ten miscellaneous hardwoods and five miscellaneous conifers that constitute the bulk of any forest population. The species

shift as you go East or West, North or South; some drop out and new ones come in, but the total number of species represented in your particular woodlot will remain about the same; in all some forty-five tree species. Some of these prefer swampy soils, others the borders of streams, still others rich moist bottom lands or high dry ridges. Some will be valuable to you for timber and firewood, others for their special uses in the arts, some will be fit for neither but will be most valuable to you because of their beauty and their wonderful autumn colorations.

You should familiarize yourself with the identification characteristics of these tree species from some good tree book, such as Romeyn B. Hough's "Trees of North America," or Julia E. Rodgers' "Book of the Trees." It is pleasant study in itself and surely a knowledge that you should have in mind before attempting to put into practice the suggestions in these articles. I give you in addition a working table of the forty-five species representative of woodlot conditions in the Middle Atlantic States, showing in condensed form their natural climatic limits, preferred soils, sunlight requirements, size and value of timber, dates of leafage, flowering, seed ripening, and autumn colorations. With a few substitutions the table will answer as far West as the Mississippi River. The dates are based on observations during



THE WHITE OAK—ONE VAST BANK OF PURPLISH COPPER IN MID-OCTOBER.

the last five years in the latitude of Asbury Park, N. J. Add or subtract two weeks for every 100 miles north or south to get approximately the correct dates in your own latitude.

With this working table and a reasonable proficiency in identifying trees let us visit the woodlot and take, as it were, a census of stock in hand. We are going to use the axe a whole lot, but not without knowing just what we are doing and just what effects we expect to produce. You will find that your first desire will be to have a reasonably complete representation of the various trees occurring in your locality so that your woodlot will also be an ar-

boretum on a small scale. You will also be delighted to discover quite a number of specimens outside of the immortal forty-five, and may tabulate, including the shrubs, some sixty-five to seventy species in getting acquainted with the fascinating tree neighbors that inhabit your woodlot.

Be also at the same time on the keen lookout for "possibilities." By that I mean those little delicious bits of landscape that Nature has already been working over, the kind that the artist's sensitive perception seizes upon—natural groves; brook vistas; a woodsey meadow filled with riotous sumac and a magnificent scarlet oak growing in it,



CONVERTING A SWAMP INTO A LAKE BY DREDGING AND DAMMING AS WAS DONE AT WYNDYGHOU, BY MR. ERNEST SETON THOMPSON.

with a colony of great crested fly-catchers perched in its top. The artist will use, in his way, the axe, just as you will do—his brush eliminates this and that feature that his feelings tell him constitute ugliness; and he may even paint in something that never was there—just as you can plant in something that Nature is crying aloud for but doesn't happen to have in this particular spot.

At first blush it seems perfectly hopeless to expect of the average woodlot any development into a sylvan paradise. The trees are all about the same size and seem very much alike. Many of them are dead or dying; the underbrush is so thick that one keeps to the old lumber roads, and as for the brook ravines they are grown up so thick with saplings that it is hard work to get anywhere near the brook! There isn't any grove nor anything that in the least resembles one; the meadow and the ravines we grant you, we have them—such as they are.

Precisely; this is just where one

starts—with the idea that this woodlot is “just trees and brush.” Later, when you have a bowing acquaintance with the forty-odd tree species you will feel differently about it and will begin to see a light. The high ground bordering ravines you will find populated with sturdy dominant trees, hemmed in on all sides by suppressed and crooked ones, under which again is a tangle of slender saplings bending every which way like a thicket of fish poles. A study of the tops of your biggest trees will show you that the branches reach far, interlacing with the suppressed tops and fighting with them for light and sunshine. If only these big fellows could be left, with their tops just touching, what a magnificent growth they would make! Well, let the axe do it and note how soon you have a grove that is an inspiration to walk in. The dominant trees will be, in general, beech, red oak, white oak, pin oak, shagbark hickory, tulip tree, red maple, rock maple, sweet gum. You want the beech because of its magnificent spreading growth and



WHAT SPRUCES CAN DO FOR A FOREST SCAPE IN WINTER.

its winter coloration. It is one of the few trees whose leaves stay on all winter, giving you a big flame of brown-yellow to show against the white of the snow and the gray of the bare trees. And if you can clear the way for some thrifty young six-inch specimen that is already succeeding, it will astonish you with its subsequent rapid growth. The white oak you save, always and every time. Not only for its fine timber, beautiful bark, and stately spread of branches, but for its foliage effects. By the middle of October it will be one vast bank of purplish copper, then brown, and finally light yellow-brown, hanging on through the winter and helping the beech to keep the forest cheerful. If you plant enough pyramidal spruces, feathery white pines and sap-green pitch pines to paint in dashes of color contrasting with the tawny beeches and oaks, you can always be sure that your snowy forest hillsides will be beautiful in December, January and February. Look at the Adirondacks in winter if you would realize what spruces can do for a hardwood forestscape in winter.

And do not let anyone persuade you to keep the red oak in preference to the white. It is true that it grows slightly faster, reaching maturity ten years ahead of the white, but it is a flashy tree having no lasting beauty or utility and its big glossy green leaves turn to a dull brown in autumn without giving us any color, after which they drop off and cumber the forest floor. Its wood is reddish and brashy, giving the tree its name, and in no way to be compared to the wood of the white oak. For vivid reds in autumn we must look to the scarlet oak, black oak and the pin oak, not the red. The pin oak prefers rich loamy creek bottoms and those flat tables at the bottom of ravines that are overflowed by spring freshets. If there is a pin oak in your grove, save it for its autumn colors and its pretty little round acorns.

Of the hickory family the shagbark will stay and be favored because of its nut crop. The mockernut is also edible, and gives you a tremendous flare of orange in the fall, while all the shagbark can offer in that line is a dull



THE PLACE TO PLANT HEMLOCKS.

brown. The pignut hickory is worthless except for its wonderful pale yellow in autumn, so that it should not be spared unless scenic features can be gotten with it in autumn. It is particularly valuable on a hillside. Sweet gum is that tree with the star-shaped leaves that turn a magnificent dark-purple in autumn. It is the only purple we have that stays, as the oak and ash pass quickly through purple to brown, and the black gum goes to red. Another feature of the sweet gum is its straight columnar trunk, straight as a spruce, not a branch on it to the fork of the crown, a handsome feature in any grove. You will not get this when it borders an open space, but the compensations in increased foliage more than repay. As for the liriodendron, the tulip tree, lucky the man who finds one growing in his prospective grove! Not only its great handsome leaves turning violent yellows in the fall, not only its showy tulip flowers, but above all its towering shaft of a trunk, straight as a lance, sturdy as a factory chimney, makes it an imposing tree in either landscape or forest.

As to maples, save the best of your red maples for they and the black willows are the very first trees to show color in the spring. Look along the edges of a forest about the end of March and note here and there splotches of deep red. These are the flower buds of the red maple and a few weeks later the woods will be fragrant with their perfume. I have a great many of them about me in the Interlaken forest and have given considerable study to their autumn color phases. The red maple may have all yellow leaves or yellow and red mixed or all red. The difference seems to lie in soil and root conditions. Where the roots have to fight for nourishment, as in wet swampy soils or dry arid ones, the autumn leaves will be red or even one solid flame of dark purple. On the other hand with rich well-drained soils it will turn a pure pale yellow, and there are all sorts of graduations between.

The sugar maples you will know at once by their smooth-edged pointed leaves with pointed base-lobes, whereas all the red maples have rounded, toothed base-lobes. The sugar maple does not thrive much south of latitude 42° but

north of that it drives out the red maple except in the swamps where it can not grow. Its autumn colors are gorgeous reds and yellows, its timber is exceeding fine and valuable, and you can tap the sturdy ones for maple syrup in the spring when you hear the first blue-bird. A three-quarter-inch auger hole put in four inches with a wooden spigot driven in will yield you three pounds of maple sugar to the tree. The juice of the red maple is by no means as plentiful or of as fine quality as the sugar maple.

To conclude the matter of the grove. Having found a fine dry locality already populated with sturdy trees bigger than the average, clean out the underbrush, and thin out all the crooked, spindling and dying trees that are obviously hampering the growth of the others. Aim to leave the canopy overhead in such shape that it will close up solid in a few years. You will find that your big fellows in doing this will have grown to really noble proportions. And I would not introduce evergreen here if I were you—a grove of Druidical oaks is your effect—but I would plant nursery saplings where you perceive such-and-such a tree is urgently needed. A nursery sapling has not only a more compact and vigorous root system but it grows much faster than the forest transplant. A three-inch nursery sapling will reach 12 inch diameter of trunk in twenty years in all the standard deciduous trees, whereas our forest-grown oaks and maples seldom reach 12 inches inside of their fiftieth year. I have had such poor results in transplanting all sizes and kinds of forest trees that I have come to regard the nursery sapling as cheaper, quicker and better except in a few special cases.

Assuming that your woodlot has a brook, let us walk the length of it from boundary to boundary. Here it comes, tumbling down through a rocky dell—what a place for hemlocks and balsams! Perhaps Nature has already put in a few or rather, man has left a few survivors. There is nothing prettier than a feathery, dark-green hemlock overhanging a brook, and you are to study your vistas with an eye to hemlocks,

taking care, however, not to choose sites that will be washed out by spring freshets. And, for those little bottoms in the elbows and turns of the brook, there is no better tree than the silvery, aromatic balsam, the Christmas tree “spruce” of the city markets. Both it and the hemlock endure shade and will grow prodigiously if you but clear away the immediate saplings without attempting to disturb the larger trees overhead. At salient points along the ravine banks you will plant white pines. They also endure shade hardily and even a little State nursery transplant will become a very respectable tree, reaching in twelve years a diameter of three inches and a height of thirteen feet, and this under considerable shade from the forest trees.

As you progress down the course of the brook you will note that the crowding of saplings in the ravine is tremendous. You can not see the woods for the trees, to use an Irish bull. Nature is sure to have grown at vantage points along the bends, here a black birch, yonder a stunning red maple, on this point a fine beech or black gum—but you pass right by these unnoticed wonders because the eye is distracted by millions of tangled saplings all crowding and fighting for sunlight and room. Here is where the axe gets to work; and in planning for it aim to have each vista frame some strikingly beautiful tree bordering the brookside. You will be surprised to find how even a few bushes will spoil a most soul-satisfying view. Clear the way! Lay out a brookside trail and let it cross the brook whenever you have some particularly lovely landscape to show off. Here we come to a tiny water meadow, grown up with rank lush grasses, with alders and blackberries bordering the stream. What a place for willows! And the sunny meadow was particularly designed for a clump of tulip trees and sycamores. If Nature has not already been there before you better hie you to the nursery and invest in *salix nigra* and *Babylonica*, *Liriodendron*, *tulipifera* and *platanus occidentalis* forthwith.

Speaking of meadows, let us not forget to be on the lookout for them in the



A LAKE TWO FEET DEEP IS AS BEAUTIFUL AS A LAKE TWENTY FEET DEEP.

uplands throughout the woodlot. As a rule Nature provides these, as it were, breathing spaces, here and there in the forest, herself, fills them with wire grass and wild roses, golden rod and iron weed, and gives her bushes—sumacs, viburnums, thorns—a chance to spread out. Catbirds and thrashers and chewinks love these places, and nest in the low bushes. Flickers come here for worms and weed seeds, and the whole glade is surrounded by beady-eyed flycatchers on the lookout for insects. The forest meadow is an amphitheater for sunloving trees. Around it gather the scarlet oaks, sweet gums, liriodendrons, blackberries—all of them one vast color scheme in the fall. Use the axe to favor them, for you will find the shade-enduring trees crowding in also; take out the red oak and leave the scarlet—what is two dollars' worth of lumber compared to fifty autumns of gorgeous scarlets! Take out that scraggly elm and favor the sweet gum, you need his red, yellow and purple stars in the autumn, and you need his button balls in the winter to the end that a colony of goldfinches may be attracted thither.

And you are likely to find a white

ash growing somewhere around this meadow. If not, plant one, for she is the undisputed queen of the forest. No tree excels it in beauty of form, foliage or autumn coloration. It wants plenty of sunlight and rich soil, and is a gross feeder, being known to foresters as the "wolf of the forest." Put in here also the American linden or basswood for its fragrant bee flowers, and leave a clump of persimmons in directing the activities of the axe, or else plant them in if you have none.

You have also to provide for winter coloration. All the trees above mentioned will be bare and gray in the winter, but you can paint in rich sap-greens with bushy sunloving pitch pines, points of green, blueberry—covered with red cedars—and feathery dark greens with your white pines. The conformation of your meadow will tell you just where to work in these effects. And do not, I beg of you, make a flat green lawn of your meadow and plant a border of rhododendrons, out in the sun where Nature never intended them to grow. If wild roses, golden rod, and purple ironweed, with scarlet sumac and great walls of living color all about are not



ARTISTIC THINNING OF BIRCH THICKET.

your idea of an American forest meadow then you and I are thinking along different lines!

An old field in the forest irresistibly calls to mind the thickets with which Nature is wont to invade these places. To the layman the artistic treatment of the thicket seems the most hopeless task of all. It is just brush, and the quicker it is obliterated entirely the better, so it would seem. But, really, a great deal can be done with a thicket; in fact, a few judicious touches here and there will make you fall in love with it and ever after have a warm spot in your heart for the once despised "brush patch." A little analysis will show you

that it is almost invariably composed of trees that are wing-seeded or have sprung from bird-dropped seeds—birches, aspens, wild cherries, sour gums and the like. None of them will ever become imposing forest trees. There are two standard methods of treatment open to you; either use the thicket as a background to set off some fine specimens, or treat it frankly as a thicket and make it beautiful. Down in Southern Utah and Nevada Nature grows silver spruces and aspens together, a hint that we may put into practice by using the thicket as a background for blue spruces. They never look better than when contrasted against



LAGOON MADE BY DREDGING A SWAMPY BOTTOM.

living green walls or a tangle of gray twigs in winter. Any strikingly beautiful tree that does not grow over-large may be used in the same way—silver pine, scarlet oak, purple beach, green ash, ginko, sassafras, dogwood; and araucaria and deodar if you live south of the 40th parallel. Sink them well into the edge of the thicket so as to appear part of it.

In the second method of treatment you will get results by judicious cutting and planting. You have many fine colors available on your palette. If you live anywhere in the range of gray birch—Atlantic Coast west to Ohio and south to Virginia—you have a wonderful tree to work with. With its slender white trunks and its feathery, quaking foliage it is a strikingly interesting object, and a very few of them will tone up any thicket. They will grow anywhere, swamp or sand barren, and there really seems no excuse for their not occurring naturally farther West.

Another good thicket color is the Judas tree, *circis canadensis*. In the early spring its abundant pink flowers are out almost as soon as the red maples and its handsome green leaves help out the feathery birch foliage. You can get it at any nursery.

Thinning out is always good and salutatory in the thicket. In doing so, spare the sour gums, as its deep reds in the autumn are wonderful and the blue-black berries are a feast for robins, cedarbirds and flickers! Save the flowering dogwoods for their white blooms in the spring and red berries in the fall; and favor the wild cherries for their fragrant blossoms and handsome fruit. The trees to go will undoubtedly be black jack, scrub oak, yellow maple, thorn and alder. If there is a mature sweet gum anywhere near, there will surely be several young ones in the thicket. Be on the lookout for them, and clear away the brush about them,

an advantage which they will not be slow to use.

Finally—swamps. There are swampy spots and swampy creek bottoms in every woodlot and the best treatment I know is to drain the one and dam the other. A lake is just as beautiful two feet deep as twenty, and it will add immeasurably to the beauty of your forest. Before building your dam run a contour line at the lake level and see just where your backwater is going to come, also noting your high spots that will later become islands. All the trees that will have their stumps submerged within these boundaries will have to be taken out as they will surely die and will be infinitely harder to take out when surrounded by water than before the dam is built. The ones that will thrive on your islands and along the borders will

be red maple, pin oak, swamp white oak, bitternut hickory, black willow, white pine, tamarack, white cedar, red cedar, sour gum, white oak (if not too wet), black birch, hornbeam, and black spruce. With these and innumerable waterloving bushes to choose from you are in a fair way to astonish yourself with your island and lake border effects!

Having transformed your woodlot into a notable forest we will need all our knowledge backed by our bird and insect allies to defend your pet vistas against the attacks of insects, fungus, and fire. I hope to present you a paper containing some ideas along these lines in the future, but at present we must hurry on to the foresting of the stony pasture.

(To be Continued.)

FEDERAL POWER SUPREME ON FEDERAL LANDS

THE contention of the Government that power companies can not secure rights of way across national forests without complying with the regulations of the Secretary of Agriculture has been completely sustained, according to the officers of the Forest Service, by the opinion of the Circuit Court of Appeals filed on November 14 in the case of the United States versus the Utah Power and Light Company.

In its decision, the court announces that Congress has assumed complete control of the waterpower question, so far as the public lands are affected, and that a State in the exercise of its sovereign authority can not interfere with or transcend this constitutional power of Congress.

Since December 15, 1900, the Utah Power and Light Company has operated its hydro-electric power works on certain public lands in the State of Utah now forming a part of the Cache National Forest, and the United States sought to enjoin this occupancy until the

company should comply with the provisions of the Act of May 14, 1896. The power company alleged that its rights were secured and protected by the Act of July 26, 1866, now Section 2339 of the Revised Statutes.

The decision holds that the Act of May 14, 1896, empowering the Secretary of the Interior to permit, under general regulations to be fixed by him, the use of, or rights of way upon, the public lands and national forest reservations for the purpose of generating, manufacturing, and distributing electric energy, repeals the Act of July 26, 1866, insofar as it related to the subject of generating and distributing electric power and that the company must acquire its rights of way in accordance with the provisions of the later act.

The court denies the company's contention that it was protected in its tenure because that tenure was authorized by the laws of the State of Utah, exercising sovereign and exclusive jurisdiction with respect thereto.

It is predicted that western yellow pine will furnish an excellent source of turpentine as the southern pine becomes exhausted.

THE ANNUAL MEETING

The Annual Meeting of the American Forestry Association will be held at the New Willard Hotel, Washington, D. C., at 11:30 a. m., Wednesday, January 14, 1914.

This will be a business meeting, and there will be no papers or addresses or discussions on forestry, as pursuant to the arrangements made last autumn, our Association cooperated with the Fifth National Conservation Congress in the meetings of the Congress held in November, and sessions of the Congress were set aside especially for Forestry, at which it was arranged that the President of our Association should preside; in addition to which sectional meetings on Forestry were held and valuable forestry papers and reports were presented by our members, and discussions held. A large number of our members attended these meetings.

Members of the Association are asked to attend the annual meeting to aid in the transaction of the business matters to be discussed at that time.

P. S. RIDSDALE,
Secretary.

HENRY STURGIS DRINKER,
President.

FOREST PLANTING ON PIKE'S PEAK

BY GEO. A. DUTHIE, *Deputy Supervisor Pike National Forest.*

OF the countless thousands of acres of important watershed within the Rocky Mountains which have been rendered treeless by forest fires, none are more widely known or of greater economic importance than the Pike's Peak watershed within the Pike National Forest. The early history of Colorado is closely associated with the Pike's Peak region. The peak itself rises almost abruptly from the Great Plains at an altitude of 6,000 feet to an altitude of more than 14,000 feet. It was a prominent landmark for the first explorers and trappers who crossed the plains to the southern Rocky Mountains, and the first settlers who followed close behind them laid their course by the famous peak and settled in the surrounding country. Then came the discovery of gold in the Cripple Creek district at the western base of the mountain, and, as the story of fabulous wealth of the mines traveled afar, thousands of settlers rushed to the mining camps, which became small cities in a day. The region was therefore well settled at an early date.

When the first white men reached the Pike's Peak region they found it covered with an almost unbroken forest cover. With the advent of the settlers and prospectors forest fires became numerous. Early settlers have told of fires that raged for weeks unheeded, and these fires recurred year after year until thousands of acres were completely denuded of tree growth and the only virgin timber remaining was in small stands in the deep, protected canons. A careful reconnaissance of the region made in 1911 showed that there are over 10,000 acres of land from which all forest cover was consumed by these fires half a century ago, and upon which there has been practically no natural restocking. It is estimated that two or three centuries would elapse be-

fore these burns would again be fully reforested if natural regeneration were depended upon to produce a satisfactory forest cover. But these burns comprise important watersheds. The streams draining them furnish a domestic water supply as well as electric light and power to a number of tourist resorts, towns and cities, the chief of which is Colorado Springs, and so for economic reasons they must be restocked as soon as possible. Then, too, the fact that the Pike's Peak region is a recreation ground for thousands of tourists each year adds an aesthetic reason for immediate reforestation, to say nothing of the loss through the unproductiveness of so large an area which should be producing timber for the market. Since the natural restocking is so slow and the need so urgent, the reforestation of these burns has resolved itself into a large job of forest planting and sowing by artificial means which, to complete, will require a liberal appropriation and extensive planting operations annually for a number of years.

Already this work has been started. For several years past planting and sowing of coniferous seedlings and seeds has been done by the Forest Service on these burns in an experimental way. Various methods of reforestation have been tried with a view to solving as soon as possible the difficulties arising in the various situations, so that a systematic reforestation plan could be made. A preliminary plan was developed following the reconnaissance of 1911 which contemplates the reforesting of 10,594 acres at a cost of \$80,111, the work to extend over a period of ten years. All of this work is to be done upon the water sheds which supply water to the cities and towns of Colorado Springs, Victor, Colorado City, Manitou and Cascade, Colorado.

During the years 1910 to 1912, in-



PANORAMA OF THE PIKE'S PEAK REGION WHERE 10,000 ACRES MUST BE REFORESTED BY ARTIFICIAL MEANS, PIKE NATIONAL FOREST.

clusive, 385 acres were planted with nursery stock and 1,280 acres were sown by various methods, at a cost of over \$17,000. For five years prior to 1910 experimental work in both planting and sowing on numerous areas from a quarter of an acre to several acres in extent was carried on. The experiments were conducted upon all of the various situations present on the watershed. The actual results of many of these plantations were total failures, but whether successful or not they all contributed toward the solution of the problems that must be met in the successful reforestation of this area, and the experience gained in this experimental work has enabled the forest officers in charge to formulate certain principles which puts the reforestation work on this and similar situations upon a definite and practical basis, so that, given a situation, they know by experience the best method to pursue.

There are a great variety of situations represented on the watershed because of the isolated position of the range. The Pike's Peak range, sometimes called the Rampart Range, of which Pike's Peak is the highest elevation, is a short, isolated range of mountains which rises close to the border of the plains. Pike's Peak lies at the northernmost end, and from it the range spreads out wedge-shaped to the south and southeast, sinking rapidly to the foothills where the Arkansas Valley merges with the Great Plains of eastern Colorado. Eastward from the peak lies the broad semi-arid plains, and to the north and west a low mountainous country well wooded with a cover of Western yellow pine and Douglas fir. In each of the latter directions it is 50 miles as a crow flies to the nearest mountains of equal height.

Pike's Peak is the last high barrier in the path of the prevailing westerly winds. In crossing the high Continental Divide these winds are drained of their moisture and are parched and dry when they strike the western slope of the Rampart Range, where they dry out the soil and blow away the fine humus and loam, leaving the surface dry and gravelly. Nearly all of the precipita-

tion is brought by easterly winds bearing moisture from the Gulf. The eastern side of the range therefore receives a much heavier rainfall, and consequently affords better planting conditions. The average annual precipitation for the entire region increases steadily with altitude. At 6,000 feet it is 14.58 inches, and at 14,111 feet it is 29.55 inches. The average annual temperatures decrease with altitude from 47.3° F. at 6,000 feet to 36.3° F. at 10,265 feet, and 19.3° F. at 14,111 feet. Since the three factors of precipitation, temperature, and wind have an important bearing on the reforestation work, they are given careful consideration in choosing the species to be used and the methods to be followed. To this list of important factors should be added a fourth, viz: aspect, since the latter determines very largely the humidity at the surface, the amount of direct insolation of the sun, the depth of snow, etc.

From experience gained through the experimental work and the study of the factors which have influenced the success of the work already done, it is possible to lay down certain definite rules or principles to be followed in this reforestation work. The following points are a brief summary of these principles, which may be considered as more or less general in their application to similar situations, both in the Pike's Peak region and elsewhere.

The highest elevation at which reforestation is attempted is about 10,800 feet. Direct sowing is more apt to be successful at high altitudes than at low ones, because moisture at the surface is quite essential, but the success of seed sowing on any situation, high or low, depends so largely upon climatic conditions, and these vary so greatly in this particular region that the outcome of seeding operations is always uncertain. On all sites, therefore, except perhaps in the most favorable, planting should be given preference over direct seeding. Whether sowing or planting is resorted to, the wind is a serious handicap to reforestation work. It dries out the soil, blows away the fine soil and humus, reduces the humidity of the air and blights the young plants. The western expos-



HEAVY FALL OF SNOW ON MAY 14 WHICH TEMPORARILY STOPPED THE PLANTING WORK.

ures suffer most from drying winds, then follow the southern, eastern, and northern exposures in the order named. The northern and eastern slopes are the most favored, for the precipitation is heavier, the drying winds less severe, they are protected from the direct sun and have greater humidity of the lower strata of the air, besides the protective covering of aspen which these slopes usually bear. Planting therefore is best for the less favored slopes. It is more expensive and much slower than seeding, but the results obtained usually prove it to be the most economical in the end. Planted stock does not require so much protective cover, because the roots extend into the soil to such a depth as to render the plant not entirely dependent upon seasonable precipitation. It is not affected so much by dry surface, and by placing sticks, sods or stones on the windward side of the

plant when it is set, as a shelter to ward off the dry winds, much less loss from wind blight occurs among planted stock than seedlings resulting from direct seeding. The extra cost of placing the shelters amounts to very little since sticks or stones are usually within easy reach of the planter as he sets the plant, and especially in the case of Douglas fir, which is most susceptible to wind blight, the saving in planted stock is well worth the additional expenditure of time.

Direct sowing should be practiced only on the most favorable situations and the work should be done on prepared ground in the fall or broadcasted on the snow in the winter over ground which has been previously dragged or raked.

The following table gives the comparative cost of establishing successful stands by these three methods in the



LABORERS PLANTING WESTERN YELLOW PINE BY DEEP HOLE METHOD IN PIKE'S PEAK REGION, PIKE NATIONAL FOREST.

year 1910. It will be noted that sowing on prepared soil, which consisted mostly of seedspot sowing, cost nearly as much as planting, notwithstanding that all sowing was done on the most favorable sites:

Method	Cost per acre	Per cent of area successful	Cost of restocking failed places	Total cost per acre
Planting.....	\$14.20	100	\$1.04	\$15.24
Sowing (prepared soil).....	7.29	46	6.05	13.34
Broadcasting on snow.....	3.05	77	2.47	5.25

Planting work should be done in the spring and as early in the season as weather conditions permit. In the Pike's Peak region it is usually unwise to plant after May 20.

Since this region is rather dry, the species used are mostly drought resisting. In altitudes of less than 9,300 feet Western yellow pine (*Pinus ponderosa*) and Douglas fir (*Pseudotsuga taxifolia*) are best adapted. The Western yellow pine endures dry winds and is therefore used on the northwestern, western and southern exposures. Doug-

las fir will not endure dry winds and must be used only on the protected northern and eastern exposures. Above 9,300 feet Douglas fir can be used on warmer aspects because of the better moisture conditions, and the colder situations are planted to Engelmann spruce (*Picea Engelmanni*), Limber pine (*Pinus flexilis*), and Bristlecone pine (*Pinus aristata*). Lodgepole pine (*Pinus contorta*) takes the place of the Western yellow pine above 9,300 feet. Only stock of the best quality should be planted. It costs as much to plant a poor, sickly seedling as it does a vigorous, healthy plant, and since the cost of planting is the heaviest item of cost in reforestation work, it is economy to throw away unfit stock.

The cost of planting operations may vary between certain wide limits, even when strict economy is practiced. The following is a list of the factors which affect the cost of all planting work:

1. Method of planting.
2. Spacing of the plants.
3. Size of stock.
4. Soil.

5. Size of operation.
6. Weather conditions during planting operations.

7. Kind of labor used.

Three methods of planting have been found applicable to the mountainous lands on the Pike National Forest. They are the dibble, deep hole, and cone methods. The following table shows the comparative cost of these three methods when similar stock is used:

Method of planting	Class of stock	Cost per acre
Dibble-----	3-0 Douglas fir	\$ 5.62
Deep hole-----	3-0 " "	7.13
Deep hole-----	2-2 Yellow pine	9.83
Cone-----	2-2 " "	14.20

¹ First figure gives the age of the stock in years from seed; the second gives the number of times transplanted before setting out on permanent site.

The dibble method can be used only with small-sized stock, two or three-year-old seedlings, and in soil that is loose, deep, and easily worked. The deep hole method is the one most commonly employed. It can be used with any class of stock, and since in digging and refilling the holes the soil is thor-

oughly worked, this method is applicable to any kind of soil. The cone method is employed only on very unfavorable locations where especial care must be used in setting the plants. When, in very dry situations with coarse, stony soil, it is desirable to use large stock with a well-developed root system, the cone method is the best because it provides for a great deal of care in adjusting the roots around the cone and gives the plant every opportunity for early rooting.

That the size of operations affects the cost per acre of the work needs no demonstration. In 1911 the cost of planting 6½ acres on Pike's Peak was \$11.80 per acre, and in 1912 261 acres were planted at a cost of \$10.04 per acre. The methods used and the stock used both years were similar, and the difference in the cost is largely due to the difference in the size of the job. In fact, a more marked difference would have been attained if weather conditions had been more favorable in 1912.

The biggest problem in economical planting work is that of getting cheap



WIRE SHIPPING CRATES DESIGNED FOR SHIPPING NURSERY STOCK ON THE PIKE NATIONAL FOREST.

and efficient labor. Planting work is always of short duration. For climatic reasons it lasts only for six weeks or two months at best, and it comes at a time of the year when all lines of work are opening up and labor is in great demand. The ordinary laborer is wholly unskilled in the art of planting, and usually does not display a very lively interest in the fine points of the work. It is necessary therefore to have a constant close supervision of the men by a forest officer to insure careful work. An officer can supervise from 25 to 30 workmen after they have become efficient, but for the first two days during the period of instruction fifteen men will keep him very busy. Because of the cost of breaking in men to the work, it is very desirable to keep the same men throughout the season, and so far as possible to secure the same men in successive years, for it is a noteworthy fact wherever the same men are secured on successive years they begin to take an interest in the work, are far more efficient and require much less supervision. In order to eliminate the drifting tramp labor as much as possible it has been found necessary to hire the men with the understanding that no compensation will be allowed any man who does not remain more than three days, and only half pay is allowed if he does not stay one week. In 1912 the men were paid \$1.70 per day with board. They were housed in tents and provided with straw upon which to spread their blankets. Competent camp cooks were employed and the men received substantial board at a Government mess. The cost to the Forest Service of subsistence per man per day was \$0.58, making the total cost per man per eight-hour day \$2.28. The number of higher salaried men required to supervise the work raised the average cost to \$2.48 per man per day. From forty to sixty laborers were employed on the job, the number fluctuating up or down with fair or stormy weather. It is one of the peculiar vagaries of laboring men that, though they may be working very contentedly, let there come a slight interruption and it becomes the signal for general quit-

ting even though they have no prospects of anything better elsewhere. Much difficulty was experienced in this respect during last spring's operations. Periodic storms which precipitated from five to thirty inches of snow occurred up until the latter part of May. During these storms the temperature never dropped to freezing and the snow quickly disappeared. The occurrence of each storm was, however, the occasion for an exodus from camp. This is one of the most serious problems met with in planting work, for it increases the cost very materially, and the man in charge must tax his ingenuity to keep the crew contented.

A few measures which have been successful to some degree to keep the planting crew contented are: (1) provide good food; (2) furnish plenty of straw for bedding; (3) furnish each tent with a camp heater; (4) provide reading matter, current magazines preferred; (5) prohibit gambling and the bringing of liquor into camp; (6) have the cook keep a small stock of chewing and smoking tobacco, socks and canvas gloves for the accommodation of the men; (7) keep a simple shoe-repairing outfit on hand for their use; (8) provide facilities for washing clothes. Some attention to such details has proven well worth while.

The economic value of this reforestation work is a matter well worth consideration. Is the benefit to be derived from these plantations commensurate with the cost of establishing and protecting them? As foresters and conservationists we have always maintained that reforestation work on lands which formerly bore forest and which are not better suited for other purposes is justifiable. However, in the Pike's Peak region the nature of a large part of the treeless areas is so inhospitable that it is a question whether sufficiently high returns could be realized if the stands were established solely for the production of timber. Other economic considerations must therefore enter into the valuation of this reforestation work if we are to show justification for the estimated expenditure of \$80,000 on this planting work.



LABORERS PLANTING DOUGLAS FIR ON NORTHERN EXPOSURES IN THE PIKE'S PEAK REGION, PIKE NATIONAL FOREST.

The primary object in making these plantations is for watershed protection, and the plantations are being made upon the watersheds of Colorado Springs and other adjoining towns. It is impossible at this time to show in actual figures just what value the effect of the establishment of a stand of timber upon these watersheds will have, but since the Forest Service is working on the theory that standing timber has a very beneficial effect on the regulation of stream flow, and observations seem to prove this theory correct, it is reasonable to assert that these plantations will have a great economic value when the value of the water secured from these watersheds is considered. Recent investigations on the subject have shown that at present the water used by the city of Colorado Springs alone for municipal and domestic water supply has an annual value of \$80,000. In addition there is 2,000 horsepower of electric water power developed on this watershed which has an annual value of \$40,000, making a total annual value of the used water \$120,000. In addition there are 40,000 horsepower still undeveloped, which it is estimated will have

an annual value when developed of at least \$400,000. Then add to this the increase in the value of the municipal water supply as the city grows and the demand for water becomes greater. With these figures on the present value of the water resources of one city in mind and the possibility of beneficial influence by a new forest cover in regulating and increasing the flow of these streams and keeping them clear and cool, the expense must be considered reasonable and justifiable.

There is small chance for appraisal of the aesthetic value of stands of timber in such situations, and yet it is by no means negligible. The Pike's Peak region is visited each year by no less than 200,000 people for the purposes of sight-seeing and recreation. It is to the wooded cañons that the pleasure seekers go and not to the open burns, and it is not unusual to hear unfavorable comment from tourists about the great barren, unsightly burns. And so there is no doubt about there being a real aesthetic value to forest planting on Pike's Peak, even if the exact measure of this value in dollars and cents can not be named.

RECONNAISSANCE: ITS RELATION TO FOREST WORKING PLANS

By R. H. BOERKER, *Forest Assistant, Lassen National Forest, California.*

THE present-day timber reconnaissance is the basis for a working plan embracing all the various phases of national forest administration. The old idea that reconnaissance is merely a stock-taking or a preparatory step in timber sale work has given way to the broader notion that reconnaissance is a preliminary step to the better handling of all forest resources. In short, reconnaissance work reveals to those of us who are working with the National Forests what our resources are, where they are, how much they amount to, and what should be done with them. This paper will attempt to show how reconnaissance, as carried on at the present time, fulfills this manifold purpose. For the purposes of this paper the results of reconnaissance may be grouped into two general classes; namely, the direct and the indirect results. The direct results of the work are: The topographic map, the type map, the estimate of the timber, the forest description and other general information. The indirect results are numerous, and will be taken up under the headings: Silviculture, Protection, Grazing, and Policy.

The most important direct result of reconnaissance is undoubtedly the topographic map. It locates things better than they have ever been located before, especially in unsurveyed or poorly surveyed country, shows where the forest may be put to special uses, and locates more definitely improvements and administrative sites. Its most valuable attribute is its permanency; the estimate and the description change slightly, but the configuration of the land remains the same. For the purpose of formulating working plans this map is extremely helpful. As intensive management develops, the need for a complete reconnaissance map of the forest will increase in proportion. Intensive management comes in disguise. Every mile

of trail, or telephone, or railroad that is built in the forest is a step toward more intensive management and a greater need for better maps. The present value of this map lies, therefore, in the more efficient execution of the rough working plans we now have, in the basis which it gives for making sales, and in



BIG SUGAR PINE AND FIRS. LASSEN RECONNAISSANCE, 1911.

the step it furnishes in preparation for the intensive plans of the future.

In general, the type map which is discussed more fully under various other heads serves several purposes. It shows the relative amount and acreage of brushland, grassland, timberland, woodland, barrens in need of a forest cover,



ALPINE TYPE, MT. LASSEN MOUNTAIN HEMLOCK OF LITTLE COMMERCIAL IMPORTANCE.

waste lands such as lava beds, and water areas. It shows the composition of the timberlands; in other words, what species of commercial importance are on each "forty," and also the relations that exist between the distribution of the various species and the factors of topography and altitude. Furthermore, it serves as a basis for applying tables which show the yield of each forest type.

The timber estimate serves a three-fold purpose. It gives us an inventory of our timber resources that is more accurate than any we have had. The estimate supersedes all former guesses, mountain-top estimates, and rough reconnaissance calculations; in itself it is an exact working plan estimate. Comparing this with the best figures we have had heretofore, one gets an idea what reconnaissance estimate means. A rough reconnaissance made in 1910 for certain townships on the Lassen National Forest showed about 316 million feet of timber. An intensive reconnaissance for the same area, made two years later, showed 808 million, or about two and one-half times as much. These figures, based on the stand upon about 80,000 acres, are fairly indicative of

how the total forest estimate would compare.

The second purpose of the reconnaissance estimate naturally follows from the first, for, after knowing how much we have the next question is how much can we sell? In other words, what is the sustained annual yield for the forest? At the present time this cut is figured from the best available data, namely, the "rough" reconnaissance mentioned above. The intensive reconnaissance figures would mean that we had, yearly, about two and one-half times more timber for sale than we did under the old method. While very interesting and important in the future, these figures are not essential at present because we are at the present cutting only a fraction of one per cent of our annual yield, and there is no danger of reaching or exceeding the annual yield for many years. Naturally all methods of regulating the cut depend more or less upon accurate estimates.

The third purpose of reconnaissance estimates, and probably the most important from the standpoint of present value, is that they serve as a basis for making timber sales. Logging propositions to attract purchasers of timber can



RECONNAISSANCE MEN HELP TO DISCOVER AND EXTINGUISH FOREST FIRES.

not be worked up until a reconnaissance of timber areas has been made.

The third direct result is the forest description. This description endeavors to give in words what can not be told on the map, and it is concerned with the present conditions under which the timber is growing. In future it will serve as a basis for making comparisons and determining whether the forest conditions have improved or not. Usually the reverse side of a special form is filled out, which includes, among other headings, amount of immature growth, its distribution and the relative percentages of the three leading species, notes on rock, soil, ground cover, underbrush, condition of timber, average age, logging conditions, and adaptability of the land to logging. The immature growth, that is, sapling and seedlings below 6 inches in diameter at breast height ($4\frac{1}{2}$ feet), is usually designated by some adjective, as "good," "fair," or "poor"; the manner of distribution is noted as "in groups," "singly," "general," or the like. Assuming the total amount of small growth to represent 100 per cent, the percentage of the leading species is given as "yellow pine 80 per cent, white fir 10 per cent, and in-

cense cedar 10 per cent." If the tables of the total stand differ from these, it can be seen whether the yellow pine is increasing or decreasing as compared with the white fir, and in what proportion. This information would help indicate the predominant species in the next crop and would be helpful in marking the timber. It might also lead one to suppose that, if the yellow pine is reproducing itself readily and the white fir is going back, the soil is better adapted for yellow pine, and therefore this species should be favored. Notes on the amount and distribution of the underbrush are taken the same way. In many cases notes on soil, rock, and ground cover can be taken more advantageously for each forest type or sub-type rather than for each forty. The logging conditions should be described on the basis of natural subdivisions such as logging units. Careful attention should be given to whether the forest is even-aged or uneven-aged, and, whatever the condition is, whether it applies to large areas, to small areas, or only to groups. This is an important matter in adopting a method of regulation. The matter of site classes, types and sub-types, and condition of the tim-



TIMBER LINE, ELEVATION 9,000 FEET, MT. LASSEN, SIERRAS, SPECIES MOUNTAIN
HEMLOCK AND WHITE BARKED PINE.

ber, should be noted, since these notes are of importance in all phases of management.

There is also considerable descriptive matter which must be collected independently of organized reconnaissance, but which at the same time is absolutely necessary for a reconnaissance working plan. Such information applies to large economic units, and when once collected for one of these units need only be revised as economic conditions change. Among the most important items are: The climate and geology of the region and their relation to tree and forage growth; the surrounding population and its relation to the broad subject of forest protection; the general logging conditions and how these affect the prices that can be secured for the stumpage; the present population, its demand and who supplies it; the industries of the region in relation to wood-consumption and other matters.

SILVICULTURE.

As has been said before, the most important direct result of the reconnaissance estimates is that they serve as a basis for making timber sales. The tim-

ber sale contracts of the present time call for a statement of the amount of timber involved in the sale, which figure serves as a basis for the amount of bond, the amount of deposit, and the amount of the subsequent payments. The accuracy of this figure is of the utmost importance in the matter of stumpage appraisal and, of course, is of great value to the man buying the timber since with the aid of them he can figure his profits. Up to the present time no better and cheaper way for working up timber sales and logging propositions has been devised.

Besides furnishing the volume of timber by species for both legal and natural subdivisions of land, other valuable data are secured. From the "forty" estimate sheets the average diameter, average number of logs per tree, and number of logs per thousand board feet, the volume of the average tree, the number of trees per acre, the average stand per acre, and other data can easily be figured. With the help of a growth table an idea of the representation of the various age classes can be secured which will give an idea of the possibilities of a second cut. The date on the number



RECONNAISSANCE IS A PREPARATORY STEP TO TIMBER SALES.

of poles per acre also gives a good idea of what the next crop of timber is going to be like. Data on the physical condition of the trees, such as the number of snags, broken-tops, spike-tops, fire-scarred, and insect-killed trees per acre, are of particular value in that they give the purchaser an idea of how much of this stuff he will have to cut on the sale area.

The topographic and type map are of course indispensable to proper silvicultural management. A working plan based on annual yield is not an immediate necessity because, so far, the annual cut is such a small percentage of the annual yield and there is little danger at present of overcutting. What is necessary, though, is a silvicultural working plan which will put the forest into a better silvicultural condition. For this working plan the maps give us detailed information of what we have, and immediately simplify the problem of what should be done with it.

The relation of slope and aspect upon soil and atmospheric moisture and how this relation affects the distribution of the species is shown in a most striking way. Comparing these maps of the east slope of the Sierras with observations

made on the west slope it is shown conclusively that the species range increasingly higher going from west to east.

This information together with the data on the estimate sheets will serve as a basis for determining the silvicultural treatment, the objects of management, the rotations and other matters. In general the mixed fir types will stand a greater cut than the open yellow-pine types. In most of our mountain forests the rotations and objects of management will be directly affected by altitude. Problems of utilization can not be solved until we know what we have, how much there is and where it is. It has been shown that the best use for lodgepole pine is poles and ties and that red fir and white fir make excellent paper. The next question is: Have we big enough bodies of these species to interest large capital?

Reconnaissance locates areas of timber that are badly in need of cutting either because they are deteriorating rapidly, or on account of insect infestation, or for other reasons. This work may also locate areas in need of planting; at least it shows the location of all brush areas, which class of lands furnishes a most important planting



SHEEP LEAVING THE FOREST IN THE FALL ON THE WAY TO WINTER RANGE IN NEVADA.

problem. In cruising Government timber a rough estimate and map of the private timber is often obtained. This estimate is of use to give an idea of what proportion of a given watershed or other unit is privately owned and what is publicly owned. By mapping in the alienated lands a more complete and effective map is secured for the purposes of fire control. Reconnaissance may locate areas especially adapted to free-use purposes. It may help to discover timber trespass or it may show along what section lines timber trespasses are likely to occur when cutting on private lands takes place.

Often silvicultural notes of value are obtained and problems suggested to men doing reconnaissance. It is an excellent opportunity to make observations on seed crops. Even the most casual observer can not help making some observations on the silvicultural characteristics of the different species, and the composition and classification of the forest types. No better opportunity could present itself for a study and observations on the altitudinal distribution of the various species. It is also an excellent opportunity to study type changes; the struggle between the different species in trying to occupy the same sites. Numerous silvicultural problems have suggested themselves to men engaged in reconnaissance. While the information and notes gathered on these problems may be of little technical value, they at least serve as a working basis for future and more detailed studies. Dendrological observations are often made in connection with reconnaissance, and it has happened that new species and new varieties have been found by reconnaissance men.

FOREST PROTECTION.

Probably the most tangible and the most direct result of reconnaissance from the standpoint of fire protection is the fact that the reconnaissance crew, usually of from five to ten men, can be used in case of an emergency as a fire-fighting force. The fundamental idea in locating the crews is of course to put them where there is timber in need of estimating. Whenever there is a choice,

however, they are sent to regions of particular fire hazard. It usually follows that where there is heavy timber worth estimating for future sales, there is also need for protecting this timber on account of its value.

The topographic and type map are of great value in preparing a Forest Protection Plan. The topographical features, such as mountains, ridges, peaks, valleys, and flats are shown, and areas of young growth are located. The loca-



A RECONNAISSANCE CAMP IN BIG YELLOW PINE TIMBER, LASSEN RECONNAISSANCE IN 1911.

tion of water courses, roads, trails, telephone lines, fire lines, railroads, saw-mills, and ranches is also of considerable value. Such a map with its timber estimate shows at a glance where the valuable property is and where the areas of greatest fire hazard are. With such data as this to work with, the matter of dividing the forest into protection units, of assigning patrolmen, and of establishing lookouts is simplified con-



SUB-ALPINE TYPE OF JEFFREY PINE AND RED FIR. MT. LASSEN, 10,400 FEET ELEVATION, IN THE DISTANCE.

siderably. The density and age of the stand, the distribution of the age classes, the species, and the topography of the country all materially affect the inflammability of a forest type. The reconnaissance map shows also the old burns that exist. By plotting these burns for the entire forest an idea of the relative fire hazard, based on past experience, is secured and the protective units can be established with this in mind.

A complete map of this kind is of inestimable value to the lookout. When he discovers a fire this map enables him to determine its exact location in regard to topography, timber, type, ownership, whether it is in a bad place or not, and how to get men to it most expeditiously.

A matter of importance, also, is the question of how much timber we are protecting and what is the value of it? Also, how much more money can be put into fire protection? If the 'rough' reconnaissance methods employed in the past show that a forest possesses five billion feet of timber and an intensive reconnaissance of a good portion of the forest shows approximately two and one-half times as much timber, it is very evident that the funds allotted to it

to protect five billion feet were actually spread out to cover two and one-half times that amount.

Protection against insects and fungous diseases is an essential part of efficient forest protection. The greatest loss sustained by insects is in the sustained annual loss of scattered merchantable trees rather than by sudden serious outbreaks. Although only a few trees are killed here and there, the killed timber which accumulates year by year soon mounts to a surprising total. Proper control work can be instituted much more effectively if the centers of infestation have been located by a reconnaissance, either especially for insect control, or in connection with ordinary timber reconnaissance. However, no better opportunity is afforded for the discovery and location of infested areas than by reconnaissance. It has been the practice to tally insect-killed trees separately from those killed by other causes. In ordinary yellow-pine stands this amounts to from 5 to 20 per cent of the merchantable stand. In connection with the regular timber reconnaissance work, the lodgepole infestation on the Lassen was estimated and mapped without any additional cost.

This reconnaissance showed that 35 per cent of the 100 million feet of lodge-pole pine was either dead or dying. Within a year after this estimate was made a sale was consummated and indications are that the infestation will hereafter be short-lived.

GRAZING.

Undoubtedly the most important result of timber reconnaissance from the standpoint of grazing is the topographical map. This map, besides locating such topographical features as roads, trails, streams, bridges, lakes, and reservoirs, also locates such minor features of especial value for grazing administration as old cabins and shacks, old sheep camps, corrals, drift fences, salt licks, water holes, springs, and seeps. The contours on the map immediately suggest grazing districts and grazing units. By consulting this map it would be no difficult matter to divide a given region into individual range allotments which are bounded by natural barriers such as ridges and streams.

The forest type map secured in connection with the topographical map mentioned above may be looked upon as the basis for a general stock-taking of the forage possibilities of a given region. This map shows in colors what areas are covered by timber, by brush, by grassland, and by water. This immediately gives an idea of the relative amounts of grass and herbaceous plants and the amount of browse. In addition to this it gives the areas covered by the various timber types. This is also of considerable value when it is known that certain plants and shrubs occur almost entirely within certain forest

types. For example, rabbit brush and bitter brush, both excellent sheep feed, are found almost entirely in the dry yellow-pine type.

On forests where grazing is of great importance, a detailed grazing reconnaissance is made, differing from timber reconnaissance only in that it secures detailed information on forage rather than on timber. With an inventory of the forage of a region as a basis, the next most important matter is the means for utilizing this crop in the most economic way. Detailed studies, on the areas that need it most, can be instituted concerning the different species of grass and brush, their seeding times and value as feed, etc., etc. Other larger problems remain yet to be solved, and these studies and investigations can be more economically carried on after a reconnaissance has been made of the region in question.

FOREST POLICY.

The Forest Service is in the van of the forestry movement in the United States. It is by all odds the largest corporation which practices forestry. Hence it has a powerful influence in shaping the forest policy of the country as a whole. Whatever the Forest Service does now, the lumberman will do as soon as he can see that it means money in his pocket. Just so with reconnaissance. The lumbermen will soon see that it will be to their advantage to find out what they have, where it is, and what is to be done with it. In other words, they will go about the matter of preparing working plans for their lands just as the Forest Service is doing now.

Thirty different wood preservatives are in commercial use in the United States; many of them utilize creosote of one sort or another; others require chemical salts.

Last year the forest service distributed 116,000 basket willow cuttings: 15,000 to forest schools, 20,000 to agricultural experiment stations, and 81,000 to individuals.

More than 800,000 horsepower has been developed from streams on national forests under government regulation. This represents the output under conditions of lowest streamflow.

Florida buttonwood, a tree confined largely to the keys along the south coast, is very highly prized for use in cooking on ship's galleys. It burns slowly with an even heat and makes but little smoke or ash.

SOME OBSERVATIONS ON THE BLACK FOREST

By F. F. Moon, M. F.,
New York State College of Forestry

PRACTICALLY everyone who has ever read German Fairy Tales as a child must have come under the spell of the Black Forest. The woods were so dark, the streams so limpid, and the whole atmosphere was so charged with the possibility of adventure that to an imaginative child it seemed the most marvelous place in the world—an enchanted realm with no particular location but nevertheless very real.

As we grew older we learned, to our amazement perhaps, that there was such a place as the Black Forest; that it was known in Roman History as the *Silva Marciana*, and really deserved a large part of its renown. At present it ranks as the most popular summer resort in the German Empire and is visited by thousands of tourists each year, attracted by the scenery and the climate.

To an American forester also, the Black Forest has a peculiar attraction

and charm. He, too, is attracted by the aesthetic features and in addition the well kept forests, so carefully managed, appeal to his professional sense.

A word or two of description of this region might not be amiss. The forest is practically a dissected plateau, lying between the Neckar on the north, the Nagold on the east, and the Rhine on the west and south; two-thirds of it lies within the Grand Duchy of Baden and the remainder in the Kingdom of Württemberg. The total area is about 2,100 square miles.

The valleys are quite steep toward the center of the region and while numerous areas may be found where grapes, fruit or field crops are raised, the bulk of the land, especially toward the south is far better suited to the production of timber than to agriculture. The orderly German as usual adapts his crop to the soil and situation and as a consequence we find fertile valleys



Photo by F. F. Moon.

SPLENDID NATURAL REGENERATION OF SPRUCE ON CITY FOREST. ARTIFICIAL REGENERATION USED BUT LITTLE.



Photo by F. F. Moon.

NURSERY OF CITY FOREST OF VILLINGEN IN BLACK FOREST. TRANSPLANTS GROWING UNDER HIGH SHADE. FIVE-YEAR SPRUCE TRANSPLANTS PRODUCED AT A COST OF \$1.38 PER -M.

surrounded by fir and spruce-clad slopes. Indeed it is the dark appearance of the fir forests which give the name Schwarzwald to the region.

As can be imagined the lumber industry is of great importance and like our own Adirondacks it is a moot question which constitutes the greater resource, the crop of timber or the annual horde of tourists, both native and foreign. Anyone who has ever toured the Black Forest during a rainy season like last August and has seen the scores of buxom German fraus with "rucksack" on back, trudging along through rain and mud, will appreciate the charm this region holds for the native. Fashionable watering places can be found like Baden-Baden or Wildbad, but the extreme popularity of the Schwarzwald and its hold on the German of average means is largely due to the efforts of the Schwarzwald Verein. This enthusiastic and patriotic society has spent much time and money in opening up the Black Forest by cutting paths, erecting sign posts, etc., for the benefit of the pedestrian.

The manufacture of clocks, watches and toys is another business of importance in this region.

Traveling north from Switzerland, along the Danube, anything but imposing near its source, the first town one finds of interest to the forester is Villingen, with its justly famous Stadtwald or City Forest.

Villingen is one of the oldest and most famous of the walled towns of Germany, dating back to the 9th Century. At that time it was an important trading post of the Eastern Black Forest region and later became the official residence of the Count of Fürstenberg, while during the Thirty Years War its walls were often besieged. These battered walls and towers are a great attraction to the average tourist, but the City Forest is of greater importance to the visiting forester.

The land now owned and managed as the Communal Forest originally belonged to the "Mark Forest" and is as old as the city itself. It has been under management since the beginning of the 17th Century, and from the standpoint

of size and yield both, is one of the most important city forests in Baden, if not in all Germany. It contains about 9,800 acres and yields about \$5.75 per acre per year net.

In contrast with the forests in Prussia and Hessen, we find that spruce and fir predominate, and instead of the pure stands of Scotch pine, etc., started from seedlings or even seed planted in drills, the forest is reproduced naturally by

species, but they have not been markedly successful, although Douglas fir has received considerable commendation on account of its rapid growth. Thuya, Balsam fir, and Colorado blue spruce have been tried with mediocre results, and white pine, instead of making good growth as it has done near Darmstadt, is ranked as a rather poor tree of inferior technical qualities. Besides it is pursued with almost fatal



Photo by F. F. Moon.

"SCHNEISE" OR COMPARTMENT LINE, CITY FOREST OF VILLINGEN, BADEN, GERMANY. THIS FOREST YIELDS OVER \$5.00 CLEAR PROFIT PER ACRE EACH YEAR.

means of skilful cuttings. Indeed, after watching the results obtained by Forstmeister Neukirch, at Villingen, and noting the splendid stands of the proper species they get naturally out of a complex mixture, the knowledge the average German forester has of the reactions between species, light and moisture, seems almost uncanny. Experiments have been made with American



Photo by F. F. Moon.

OLD TOWER AND CITY WALL OF VILLINGEN, BLACK FOREST, GERMANY, ONE OF THE EARLY TRADING CENTERS OF THE BLACK FOREST. IT IS MENTIONED AS EARLY AS THE 9TH CENTURY. NOW CENTER OF CLOCK-MAKING INDUSTRY.

persistence by the male deer as the German bucks show a pronounced favoritism for this American tree to rub the velvet off their horns, selecting it in preference to any of the native species. As a consequence the bark is rubbed to shreds and the young pine saplings soon die. Successful plantations of



Photo by F. F. Moon.

BRUSH BURNING ON SCLUFFERSCHAFTSWALD, BLACK FOREST. BRUSH IS PILED AND BURNED ON SITES WHERE IT COVERS THE GROUND TOO DENSELY TO PERMIT NATURAL REGENERATION.

white pine can only be made if the area is fenced; a rather expensive operation and one apt to discourage the use of this species.

A certain amount of planting of native species is done where natural regeneration happens to be faulty. The seedlings used in this work are raised on the nursery of the City Forester, and while their methods differ from American nursery practice (they use high shade entirely and believe in limiting the number of seedlings per square foot of nursery bed since it costs less for seed and they maintain that close competition weakens the young plants), the young seedlings and transplants are extremely thrifty looking and the cost astonishingly cheap. (Five-year-old spruce transplants are raised by Forstmeister Neukirch at a cost of \$1.38 per thousand.)

The annual cut of the forest averages about 21,000 cubic meters, about 32 cubic feet per acre per year, which brings a gross revenue of \$76,000 and a net financial yield of \$54,000 which adds considerably to the budget of the

city fathers. It might be said in passing that this record is far surpassed by the financial results obtained on the Communal Forest of the town of Gaulsheim, Baden, a small village in the Black Forest, located next to Forbach in the Murg Valley. This village of 800 inhabitants has owned a communal forest of 2,000 acres for some centuries from which it gets enough revenue to pay the operating expenses of the forest, the running expenses of the village itself and besides declares a yearly dividend of \$4 to each inhabitant.

With the above facts in mind it is not at all surprising that some of our most progressive States have passed laws enabling towns and cities to acquire land to be operated as City Forests. The growth of this idea will mean much toward the spread of forestry and the better use of land. Many a town in the Northeastern States could profit by the example of Villingen and Gaulsheim and get a substantial revenue from adjoining areas now considered waste land; incidentally the appearance of the



Photo by F. F. Moon.

FINAL APPEARANCE OF SELECTION METHOD. SCLUFFERSCHAFTSWALD FORBACH, BADEN. ALL OF OLD TIMBER REMOVED.

environs would be vastly improved in most cases.

From Villingen, following the regular route we pass through Triberg, a Forstamt of comparatively small importance but noted for possessing, in the Falls of the Gutach, the most superb cataract in western Germany.

From Triberg to Rastatt there is little of interest, but at the latter place we tap the valley of the Murg, celebrated for the superb ship timbers it furnished in times past to the ship builders of the Lower Rhine and Holland.

At Forbach in the Murgthal, conditions were met which were of especial interest on account of the close resemblance they bore to our Adirondacks, countries, of course, excepted. The soil is thin, slopes are steep, rain fall sufficient for purposes of regeneration and the past treatment astonishingly like that of the North Woods.

The original owners cut their timber and floated it down the Murg and via the Rhine to Holland, and on account of the heavy transportation costs and toll charges levied by the various principalities, etc., through which they

passed, only the timber most accessible, and the best of that, was cut. This led to heavy overcutting of the lower slopes followed in some cases by fire and the upper slopes remaining untouched went ahead accumulating forest capital.

From 1840-1860 various portions of the old Schifferschaftswald were purchased and brought under the management of a stock company of which the Duchy of Baden holds the controlling interest; the forester in charge, is therefore a state official. The part of this amalgamated forest, known as Forbach II containing 12,000 acres is in many respects the most interesting forest, to an American at least, in all Germany. In the first place it is composed chiefly of conifers like the forest of Maine and the Adirondacks; it had been more or less abused in the past by overcutting and some burning; the timber on the upper slopes was over ripe and deteriorating when it was put under the control of the State. Conditions having a very similar sound to those that obtain in some of the Northeastern States.

Their method of attacking the prob-

lem was to apply the fundamental principles of forest management; ripe timber should be cut and the yield should be regulated with regard to the amount of forest capital standing on each unit of area. By extending the road system portions of the forest previously inaccessible were opened up and were able to do their share in furnishing the annual cut.

As one would expect, from the silvicultural and economic conditions found here they have avoided a clear cutting system; the Selection method being used on steep slopes and the Group method on benches and gentle slopes. This is not only gives Forstmeister Stephanie great freedom in locating his cuttings but also keeps the slopes under cover, which prevents erosion and does not offend the eye of any of the many tourists who pass through the valley of the Murg.

The criticisms so often leveled against these systems viz., slow to regenerate, apt to produce inferior timber, expensive, etc., carry little weight with the Forstmeister.

Natural regeneration is all that could be desired, out of the 105 acres regenerated each year, about one-fifth only is reproduced artificially; concerning the quality of the timber, 72 to 80 per cent is "use wood" and as far as the financial side is concerned, the enormous revenue of \$11 per acre per year net, speaks for itself. It is only fair to state, however, that a portion of this phenomenal yield is due to their gradual removal of the surplus of forest capital in the older age classes. (With their rotation of 120 years, periods being 20 years each, one would expect one-sixth of the forest capital in each

age class; instead there is 55 per cent in the oldest age class. They can and should cut more than their growth.)

The road system of this revier is wonderfully complete and well maintained—68 miles of splendid woods roads (which, by the way, compare most favorably with some of our State roads), and 95 miles of slide ways. The woods roads are from 4 to 6 meters in width, limited to a grade of 10 per cent, and cost from \$2 to \$2.50 per running meter. For the extension and maintenance of this system \$4,500 per year is set aside from the forest budget; a large sum to be spent annually on roads from our point of view, but absolutely necessary and economical on a perpetually managed forest.

The interest that this revier has for the American forester is the fact that conditions of climate, site, past treatment, etc., are as similar to those found in the Adirondacks as the two countries will permit (timber higher and labor cheaper in Germany, of course).

Under State direction they have collected a group of holdings previously mismanaged: they have exploited areas previously uncut and carefully regenerated previously overcut areas. They have reforested where necessary to complete the stand; they have extended the road system at a cost equal to one-sixth of the net income and have found it profitable, and as proof of the pudding they are getting more from these steep, rocky acres than many of the so-called agricultural lands in the United States will yield. All of which has been done without impairing the beauty of the Murg Valley, so that it is still a favorite recreation spot with the tourist and health seeker.

There are 703 bighorns or mountain sheep in the national forests of Nevada.

In 26 States there are State foresters who cooperate with private timberland owners in solving forest problems.

The forest service maintains nine experiment stations for studies in reforestation and similar subjects.

A national arboretum is being established in Rock Creek National Park, District of Columbia. Eventually it will contain all American tree species which will thrive there.

FOR AN APPALACHIAN NATIONAL PARK

BY DONALD GILLIS

TO promote the establishment by the United States of a great national park system in the Southern Appalachian mountains The Appalachian Park Association was formed at Asheville, N. C., a short time ago, with Governor Locke Craig of North Carolina as president and George S. Powell as secretary. The conduct of its affairs is entrusted to a board of directors, headquarters being in Asheville.

The scope of the association is not sectional, its list of vice-presidents, not yet completed, including the governors of Alabama, Georgia, Virginia, South Carolina, and Tennessee, and citizens representative of other parts of the country such as Charles Lathrop Pack, of Lakewood, N. J.; E. W. Grove, of St. Louis; Mrs. William Cummings Story, president of the D. A. R.; nor is any suggestion made as to location of a park, although it is assumed that a great mountain park would naturally be where the Appalachians culminate in their highest peaks and where climate and natural beauty would make for the most attractiveness.

The association plans look to converting the most suitable parts of purchases under the Weeks law into parks, thus making them available to the people for recreation, pleasure and health, as well as serving the primary purpose of conserving the water supplies of navigable streams. It is therefore declared in the constitution that "Its principal purposes are to urge the National Forest Reservation Commission to acquire as rapidly as possible under the Weeks law the larger areas proposed or recommended by the Commission and the Forest Service for purchase in the Appalachian mountains, and to ask Congress for such additional legislation as

may be necessary to carry out these purposes and to make the most suitable parts of such purchases available to the people for recreation, pleasure, and health."

It is the intention of the association to be an auxiliary to the Reservation Commission and the Forest Service, attaining its aim by supporting these governmental agencies in securing the extensive purchase areas they desire. It will therefore seek to have purchases under the Weeks law concentrated and consolidated and not made in fragmentary units incapable of harmonious development. The organization merely seeks results—to attain them it is entirely willing to efface itself.

The organization believes its purpose and methods of procedure to achieve it are practicable. Certainly the men back of it are practical; they are for the most part men of affairs, familiar with difficulties and the means of overcoming them, but sentimental enough to disinterestedly work for the preservation of this mountain wonderland for posterity. If they day-dream it is that a comprehensive system of national roads through national parks, connecting with radiating State roads, may become a reality in the near and not distant future.

The association seeks to popularize itself and make itself an agency through whom the people will act. To this end its membership dues are placed at ten cents. Most of those who have subscribed to its organization fund have furnished lists of names to the payment of whose dues the subscriptions were applied. The organization has already effectively interested influential agencies favorably to its aims and is working persistently and methodically, if not swiftly.

The gathering and selling of acorns is a new industry, in Arkansas, to supply eastern nursery firms with material for forest planting.



A TYPICAL SCENE IN THE SOUTHERN APPALACHIANS, WELL WOODED HILLS OVERLOOKING A NARROW AND WELL-WATERED VALLEY.



PEARSON'S FALLS, NEAR SALUDA, NORTH CAROLINA. A BEAUTIFUL SPOT IN THE APPALACHIAN REGION.



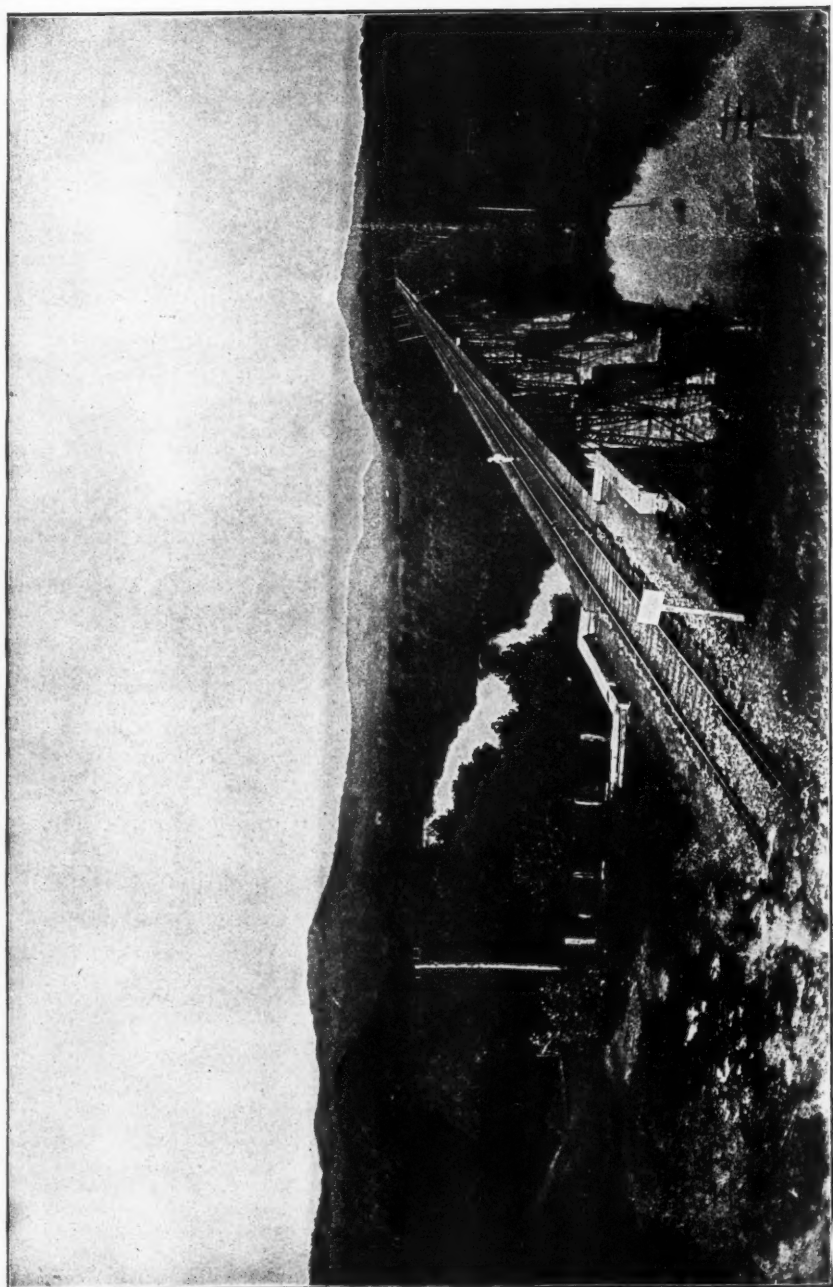
WHITE PINE FOREST IN THE SOUTHERN APPALACHIAN FOREST RESERVE,
SHOWING REPRODUCTION OF CUT-OVER LANDS. GRAHAM COUNTY, NORTH
CAROLINA.



Balsam Mts. From Top of Notts Balsam.

Copyright 1910 by J. M. Allen.

BALSAM MOUNTAINS FROM TOP OF NOTTS BALSAM, IN THE TERRITORY WHERE MANY PEOPLE WOULD LIKE TO HAVE A NATIONAL APPALACHIAN PARK ESTABLISHED.



THE SOUTHERN END OF THE APPALACHIANS, NEAR CARTERSVILLE, GA.



A SCENE IN THE SOUTHERN APPALACHIANS SHOWING, IN THE RIGHT FOREGROUND, THE EFFECTS OF EROSION
ON A DENUDED HILLSIDE, WITH WELL-WOODED KNOLLS IN THE BACKGROUND.

FOREST CONSERVATION AND AGRICULTURE

BY THEODORE S. WOOLSEY, JR.

[That there can be no sustained and permanently successful agriculture without forestry; that countries not possessing forests are decadent; that forests exercise a salutary effect on the health of the people; as well as protect the water supply, affect the climate, and prevent damage to crops, are some of the contentions in the following excellent article by Theodore S. Woolsey, Jr. This article was prepared for presentation before the United States Agricultural Commission in London, England. Mr. Woolsey emphasized the fact that he was expressing his personal views and was not speaking officially for the Forest Service.—EDITOR.]

WOULD it be going too far to say there can be no sustained and permanently successful agriculture without forestry? I think not. You will find that those countries which have destroyed their forests and have not adopted a wise policy of forest management, are those countries which today are decadent, and whose agricultural resources have suffered.

Perhaps M. Clementel, the Minister of Agriculture of France, was a little too pessimistic when, at the recent forest congress, he recalled Colbert's prophecy that, "Not only France, but the entire civilized world, will perish through lack of wood," but it is certain, as I have already emphasized, that every progressive country must practice forestry, and that "deboisement" and decadence go hand in hand. This is not a new idea, since according to Dr. Régnault such men as Leonardo da Vinci, Bernard Palissy, Columbus, Seneca, and Pliny drew attention to the disastrous effects which would follow deforestation. Look at Greece, at Assyria, at Palestine, and Arabia, today; possibly some members of this commission have seen the results of deforestation in the Austrian Karst, in Spain and in certain portions of the French Alps. Moreover it is pretty generally recognized that the influences of a forest go further than merely covering the soil, absorbing rainfall, and protecting mountains from erosion.

How closely is the health of a nation linked with so-called national parks, which furnish breathing-spaces and vacation grounds for men suffocated by

the work of modern competition? A famous Frenchman has stated that "this need of the beautiful is deep-rooted in our very nature," yet forests not only give us pleasure, but in addition exercise a salutary effect in our health. Examine the Landes in France, where formerly the population was fever stricken, and where to-day through the reforestation of maritime pine coupled with drainage, an unhealthy district has been made healthy, and besides yields a handsome revenue. I need not go into details in calling your attention to the beneficial influence of forests on springs, in preventing hail and damage to crops from wind and storms, in favoring precipitation, in controlling avalanches, and in tempering the general climate of a region. The French believe that forests have an unquestionable influence on local climate, although some scientists look for further proof before accepting this theory without reserve. So much for general forest influences.

PROGRESS IN THE UNITED STATES.

The opinion that the United States are backward in forestry is only too widespread. As a matter of fact, if I may be permitted to say so, we have a most efficient Forest Service, organized by Mr. Gifford Pinchot, and now directed by Mr. Henry S. Graves. A number of States have appointed States Foresters, and I see no reason why it cannot be safely predicted, that after the next ten years we shall be at least abreast, and possibly ahead, of other great powers in many lines of forest work. But in order to accomplish what



VIRGIN REDWOOD IN CALIFORNIA—THE KIND OF TREES THAT DO NOT GROW IN EUROPE. THESE ARE STRIKINGLY IMPRESSIVE SAMPLES OF THE TREE AT ITS BEST.

we should, it is absolutely essential that private owners realize the disastrous effects of deforestation, and on the other hand be made to appreciate the benefits which may result from cutting their timber on a reasonably conservative basis.

Even today many public men, I am sorry to say, have no clear conception of what forestry comprises. There may be members of this Commission who think that forestry only means preserving trees, or planting waste land. This is too narrow a conception. They should also think of forestry as a business. As a matter of fact, the United States Forest Service today is selling timber on an organized basis, because

it feels that to conserve over-mature trees would mean a loss to the public treasury, and would not be practicing forestry. It realizes that grazing, in many cases, damages forests, but it feels, on account of the importance of the grazing industry in the West, that it is preferable to have regulated grazing, because it is a necessary part of western industrial development. It is opening agricultural land, even if it lies within a national forest, because it sees that development in the West depends upon putting the western land to its highest use. It is protecting forests from fire most successfully, and in this one work alone the Forest Service today fully repays Congress, and the peo-



A TYPICAL FOREST-COVERED MOUNTAIN SIDE. HERE THE TIMBER MAY BE CUT AS A CROP, AND IF THIS CUTTING IS PROPERLY DONE AND THERE IS ADEQUATE PROTECTION FROM FIRE, THE APPEARANCE OF THE MOUNTAIN AND ITS VALUE FOR TIMBER PRODUCTION MAY BE RETAINED.



FOREST IN THE UNITED STATES IN WHICH A FIRE IS RAGING. THIS SHOWS THE HEAVY UNDERGROWTH WHICH FURNISHES READY FUEL TO THE FIRE AND HAMPERS THE FIRE-FIGHTERS IN THEIR WORK.

ple of the United States for the annual appropriation; and what is true of the Forest Service applies to many of those States which have organized State services.

FOREST SOILS.

One of the most important steps which any Government has to take is to decide what land is most valuable for agriculture, and what areas should be retained permanently under forest cover. It is hard to lay down general principles, because not even a financial criterion is a fair basis upon which to decide this question, for the proper decision will vary in different localities; but I am certain that it is an error in public policy to give to the agriculturist those soils which may be cultivated only temporarily, and which, after the humus left by the forest has been exhausted, become waste.

There are examples of this class of

soil in the United States, which have been settled through railway or real estate speculation, and where many of our best type of citizens have been ruined, because they tried to cultivate soil which should have been retained under forest cover. Similarly, such soils as are found in the Jura must without doubt be retained under forest. They now yield a handsome revenue in forests, but if they were to be denuded for agriculture, they would soon become valueless.

On the other hand there are many forest stands in the West of the United States on land covered with timber which must some day be cleared and devoted to agricultural use, partly because the soil yield will be greater from agriculture, but also because many of these timbered valleys are not required for water-shed protection. But whether land is chiefly valuable for agriculture or not cannot be judged solely from



THIS SLOPE WAS FORMERLY WELL WOODED FOREST. IT WAS CUT OVER AND REVERTED TO CHAPARRAL. THE CHAPARRAL WAS LATER BURNED TO SUCH AN EXTENT THAT ITS VALUE AS A WATERSHED COVER HAS BEEN DESTROYED.

the financial results; the industries and welfare of States and communities must be considered where their industries depend upon a sustained stream flow necessary for navigation or manufacture.

FORESTRY PRACTICE.

Granted the general principles of forest influence, this Commission might well enquire, "What does it cost to practice forestry?" I can state at once that to practice forestry on a rational basis costs very little, and in some cases may yield a considerable revenue. I do not go to the extreme of claiming some of the returns which you have seen claimed by foresters, because one cannot help but realize that an oak forest for example which may take two centuries or more to mature, will not yield more than 1 or 2 per cent under certain circumstances; on the other hand, forests of maritime pine, such as you find in the Landes, or forests of silver fir, such as occur in the Jura mountains

of France, may yield a net revenue of from four to eight per cent on the capital invested. This revenue is in addition to indirect benefits.

NATURAL REGENERATION.

But you might go further, and ask, "After you have once secured your forests, how can you regenerate them under present conditions in the United States, where even agricultural laborers are difficult to secure?" The answer is simple. Regenerate your forests naturally, by practicing forestry. The French secure their second crop of maritime pine by merely cutting clear and protecting from fire, and allowing the seedlings to come up naturally. The silver fir in the Jura is cut on what is called the selection system, by the removal of single trees or groups of trees, and the young growth is found everywhere, without the slightest expense for planting or sowing. The beech and oak in France are first opened up to permit the young seed-

ling to start, and then gradually uncovered, until at the first cutting you will find the soil completely covered with regeneration, at little or no cost. These same principles can be applied in the United States.

RESTRICTIVE LEGISLATION.

Since, in some localities, the permanent welfare of the community will depend on conservation cutting, let us consider what steps are being taken to insure this kind of cutting. As yet, there has been no repressive legislation in America to force owners into practicing forestry, and I feel sure this will seldom be necessary, because our citizens are too public-spirited, when once they realize that the development of the locality is at stake, to pursue methods that would ruin the prosperity of others. Yet I wish to call your attention to what France has done in Algeria to prevent the unwise destruction of forests. Article 76 of the famous

Algerian Forest Code, promulgated in 1903, gives in a nutshell the conditions under which private land can be expropriated as a measure of public utility:

1. For the maintenance of lands on mountains or slopes.
2. For protecting the soil against erosion of rivers or torrents.
3. To ensure the existence of springs and water-courses.
4. To render stable the coast dunes and those of the Sahara, and for protection against the erosion of the sea, and drifting of sand.
5. For the defense of territory in the frontier zone.
6. For the sake of public health.

The direct or indirect protection of agricultural soils in Algeria was one of the main justifications for this law.

Such legislation as this, it is hoped, is not going to be necessary in the United States, but it shows what the Republic of France has seen fit to promulgate.



NEW YORK STATE NURSERY AT SALAMANCA. THESE BEDS HAVE SEEDLINGS ONE, TWO AND THREE YEARS OLD AND THESE ARE USED FOR PLANTING STATE LANDS OR ARE SOLD FOR THE REPLANTING OF PRIVATE LANDS.

How can we practice forestry locally many ask? The answer is simple. Consult the State forester, if you have one. If not, write the Forest Service at Washington or employ a reliable consulting forester just as you would consult a doctor, a lawyer, or a civil engineer. Ordinarily a forester must see local conditions before prescribing a remedy.

FOREST MANAGEMENT.

Practical forest-management¹ is applied by the forester in the administration of public or private forests for the same reason that the modern farmer manages his farm under scientific principles, instead of by the hit-or-miss system of a century ago. Any stand ought to yield more with forest management than without it. The application of forest management includes much that the lumberman has overlooked. In the first place, the proper rotation or age when the timber crop reaches maturity is determined not by guess-work, but by considering the amount, size and quality, of merchantable material that can be cut after a given number of years, as well as the demands of the community, business, and market. A clear understanding of the silvics and growth of a species enables the manager or owner to weed or thin his stands at the proper time, and to remove the trees that are retarding the development of the final crop; to secure a succession of crops by the most suitable system of natural reproduction; or if adverse local conditions prevent this achievement, to sow or plant the proper species so as to fully utilize the ground for which it is best suited. Frequently, only the crudest methods can be applied, when, because of poor market conditions, the final crop has but little value; to work a forest intensively at the cost of all direct or indirect profit would not be following the correct management principles. It is apparent that without efficient fire protection, no conservative cutting can be successful; nor should the owner cut conserva-

tively, no matter whether public or private property is at stake, without a clear understanding of the ultimate gain which is to be secured by any sacrifice in today's receipts. The business manager does not change his methods without definite reasons, nor should the owner of a forest. But perhaps the gain cannot be expressed in dollars; it may be protecting the watershed of a navigable stream, safeguarding the water supply of a community, or providing a playground for a commonwealth. Often the forest can be made use of as a breeding-ground for game. Hence it is vitally important that the kind of forest management adopted should conform to the object to be gained.

The cultural rules, method of regeneration, and intensiveness of management, must necessarily depend on the aims of the owner. The State or National Forests must be managed on a broader financial policy than the private owner could afford to adopt. The individual must often put the financial returns first, while the State can well afford to raise the material most needed by the local industries or to maintain the cover, merely interrupted by light selection fellings. Moreover, in the case of important rivers, such as the Mississippi, which rises in the Lake States, and wherever forest lands are important for watershed protection, it may be best (even at a sacrifice in yield) to maintain a heavy cover. The individual must cut his forest crop so as to get the best returns, unless the public demands for its protection that the cover be maintained as a measure of public safety. You have seen that in Europe the policy of restraining the private owner from cutting, when it damages others is clearly established in law.

I hope that I have made it clear that successful agriculture in the long run cannot be attained unless a nation adopts forest management in its broadest sense.

¹ This definition follows what I have written in a manuscript on "The Red Pine in the Lake States."



THE LAST ACCESSIBLE PRIMEVAL PINES IN NEW HAMPSHIRE.

TRYING TO SAVE PRIMEVAL PINES

THE Society for the Protection of New Hampshire Forests is endeavoring to raise \$2,500 to save a grove of twenty-five magnificent primeval pines in New Hampshire. These pines are on the road from North Sutton to Warner. In circulars which the society is sending out it asks that checks be made payable to George T. Cruft, treasurer, and sent to Montgomery Rollins, 6 Hancock avenue, Boston, Mass.

This last accessible grove of primeval

pinos in New Hampshire is located less than a quarter of a mile from the charming village of North Sutton, on the road to Warner. This road is much used between Sunapee and Concord, and traverses a beautiful country.

Twenty-one splendid primeval pine trees are standing. Seven of these form one group close to the roadside. They measure seventy feet from the ground to the first limb. The remaining fourteen, equally large, are mingled in an attractive grove of old hemlocks,

birches and maples, directly across the road. The total height of the pine trees is from one hundred to one hundred and twenty feet.

When Professor Roth, Dean of the Michigan Forest School, visited these trees recently, he said: "They remind one of the big trees in California, and should be saved at any cost." During the twelve years that the Forester of the Society for Protection of Forests has been at work in New Hampshire, he has seen no trees anywhere as fine. They are two hundred and fifty years old, good for another century, and

among the largest white pines that any State has produced.

By careful measurement each of the two largest trees contains three thousand feet, board measure. Everyone familiar with timber knows that a tree containing one thousand feet is unusually large.

The owner will give the land for a reservation, and will sell the hardwood timber at one-half price. He has, however, sold the pines and hemlocks to a lumber dealer. About twenty-five big trees have already been cut off, and it is necessary to move quickly in order to save the remaining twenty-one.

CONSERVATION OF LIFE IN THE LUMBER CAMPS

BY MISS MABEL T. BOARDMAN

THE Red Cross Societies in all countries, though primarily organized to take charge of volunteer aid to the sick and wounded in time of war, have broadened the scope of their work to include the mitigating of suffering after great disasters. To fulfil their duties successfully and efficiently under both of these conditions necessitates the maintenance of a permanent, if skeleton, organization with a trained, skilled and experienced personnel. This means not only an expenditure of considerable funds, but also the creation of departments for special work. Organized and maintained, these departments have proved not only of untold value during war or disaster relief, but have become capable of rendering a constant, patriotic and humane service to the country in its every-day life.

The vital statistics of our country are as yet far from perfect, and no data concerning accidents in the lumber industries could be obtained from the Census Bureau. For this reason we are forced to base our statistics on those obtained from the State of Washington, where 47,400 men are employed in this industry. In twenty-three months' time we find 251 fatal accidents occurred, 990 persons permanently partially disabled, and 8,420 suf-

fered from temporary total disability. To bring this down to monthly averages gives us more than ten killed, forty-three permanently partially disabled, and three hundred and sixty-six temporarily totally disabled in one month.

I note in his address last year, Major E. T. Griggs said that 800,000 are employed in the lumber industry, one-sixteenth of that number being employed in the State of Washington. We have no reason that I know of to assume that lumbering is a more hazardous occupation in that State than in any other. Therefore, I think we are justified in multiplying the above figures by sixteen for one month, then multiplying this by twelve to obtain a rough estimate for accident statistics in the entire lumber industry. This will give us 1,920 killed, 8,256 permanently partially disabled, and 70,272 temporarily totally disabled, annually; or about 5 killed, 22 permanently partially disabled and 182 temporarily totally disabled a day. This is, of course, an estimate based on the Washington statistics, and may not be accurate as to the rest of the country.

Major Griggs, in his address, said: "With an industry affecting throughout the United States over 45,000 saw-mills and 800,000 employes, regardless of families dependent on them, you will



AN ILLUSTRATION OF FIRST-AID WORK BY TRAINED CREWS OF MINE WORKERS IN THE NATIONAL MINE SAFETY DEMONSTRATION, HELD AT FORBES FIELD, PITTSBURG, NOV. 1, 1911.

agree with me that we are all vitally interested in workmen's compensation."

If we are vitally interested in compensation laws, should we not be still more vitally interested in the prevention of the need of such compensation; that is, in the instructions for the prevention of accidents and in the practical application of first aid to the injured for the lessening of fatal, serious or prolonged results of accidents when they do occur, interested not only for the sake of 800,000 men employed but for the families dependent on them?

There is almost no labor utilized in the lumber industries that has not some danger involved in it. The sharp edge of the axe or the jagged teeth of the saw in a moment may cause an injury where unchecked hemorrhage will result in death in a brief space of time. Physicians have signed many a death certificate of men who bled to death from slight injuries and whose lives might easily have been saved by some knowledge of first aid. The applica-

tion of cobwebs or some other traditional remedy to an open wound or the use of soiled rags in binding it up often produce an infection with crippling or fatal results.

There is danger to the sawyer from the falling tree, especially when a rotten heart or high wind makes the direction of the fall uncertain; or on steep slopes if the tree shoots suddenly downward, or if a badly strained tree breaks with great force. The handling of the logs at the skidway and the loading onto the trains require skill and agility on the part of the loaders to avoid being caught and crushed by these great pieces of lumber.

The temporary nature of most of the railroads provide their share of accidents, and danger lurks even in their construction, in the blasting of stumps and rocks, and the thawing out of dynamite in the colder camps. Nitroglycerin may be absorbed through the hands, causing severe headaches to the men who use it.

Those who have never seen a lumber camp have yet had vividly impressed upon them by graphic stories the hardships to which the log drivers are exposed, the great personal danger to the river drivers in the excitement of freeing jammed logs, when a single slip may mean the crushing out of life between the heavy logs or drowning in the water below them. Nor does the danger end with the logging, for the saw-mills, with their powerful and sharp-edged machinery, add their quota to the number of yearly accidents.

Recognizing, as we must, the hazards, dangers and accidents in the lumber industry, our desire is naturally aroused to do something in the way of prevention and in extending to the lumbermen the knowledge of first aid.

I note in the Washington law for workmen's compensation, which is a sort of State insurance, the employers of labor paying the premium, that if statistics show an undue number of accidents among the employees of any given company because of poor or careless management, the rate charged that company is increased. It seems to me this law should also be made to work the other way, so that any company making a good showing in the way of fewer accidents than may be taken for the normal number, should have its rates correspondingly reduced. Even if this is not done, the less that has to be paid out in compensation by the State will have a tendency to reduce the general rates paid by the companies.

The Red Cross will gladly cooperate with the Bureau of Forestry and the lumber companies in arranging for first aid instructions. Conditions in lumber camps differ greatly from those in mines, railroads and other industrial plants. There can rarely be physicians resident in such close proximity to lumber camps that their services for instruction can be easily made available. For this reason, it would be advisable to secure the entire time of a certain number of doctors for this purpose. To make an experiment—and we learn best by experience—the Red Cross makes this proposal: Towards a fund

of \$3,000 it will contribute \$500, if a number of lumber companies in a given locality will club together to raise the additional \$2,500, each contributing according to the number of their respective camps and employees. This fund will provide for the salary and expenses of a physician specially trained by the Red Cross for instruction to men engaged in the lumber industry both for the prevention of accidents and first aid to the injured. In connection with logging camps, there should be added certain simple but important instructions in camp sanitation for the benefit of the general health of all the men.

Such a doctor devoting his entire time to this work would travel from camp to camp. In cases of remote camps, he would stay long enough to give the men daily instruction for a short time. In cases where a number of camps could be reached more easily from one place, he would arrange to give one or two lessons a week at each camp. The classes are formed from volunteers who are given practical training. The men soon realize the importance of such knowledge and are anxious to learn. Even those who gather about as spectators pick up not a little useful information. Each camp should be supplied with first aid outfits suitable to the needs of logging accidents, and these the men taught how to use. This is naturally but a tentative plan, with many details to be worked out; but may I commend it to the consideration of those interested in the lumber industry and suggest that they appoint a committee or representative to confer with the first aid department of the Red Cross upon this matter.

Again I am tempted to quote from Major Griggs' able address. He said: "Logging is a hazardous life at the very best and calls for strong, dare-devil men and men who are willing to take chances. Danger is always present and men become so used to it that they get careless. This, however, is no excuse for needless loss of life and limb."

He commends: "the benefit of co-operative effort in conserving human

life and in protecting the bread-winners, upon whom depend the life and happiness of so large a population."

The American Red Cross offers to do

its share in this cooperation for the conservation of the life of the lumber-jacks in the logging camps throughout our country.

* An address at the Fifth National Conservation Congress.

THE GOVERNMENT FORESTS

The Annual Report of Chief Forester Graves Shows that the Past Year Resulted in the Greatest Progress in the National Forests.

MORE than two billion board feet of timber, with a value of four and one-half million dollars on the stump, was sold by the Forest Service last year, according to the annual report of Henry S. Graves, forester. This is an increase of 167 per cent over the sales of the preceding year. The timber sold was largely for future cutting under contracts that will run for a number of years. The actual cut was a little less than 500 million board feet, an increase of 15 per cent over 1912. Still larger sales are in prospect.

TIMBER SALE METHODS AND PROBLEMS.

The timber-sale policy of the Forest Service is summarized as aiming first of all to prevent losses by fire, and secondly to utilize the ripe timber which can be marketed. Other aims are: to cut so as to insure restocking and forest permanence; to get the full market value for the timber sold; to prevent speculative acquisition and private monopoly of public timber and to maintain competitive conditions in the lumber industry so far as possible; to provide first for the needs of local communities and industries; to open lands of agricultural value to settlement without allowing them to be tied up by timber speculators; and finally, to secure as soon as possible the cost of production and administration to the Government and a revenue to the national forest States, to which go 25 per cent of all receipts.

A large number of national forests already more than pay operating expenses. The revenue from the Alaskan forests now exceeds the cost of administration. The same is true generally in the southwest.

RANGE MANAGEMENT AND RECEIPTS.

The forage resources of the national forests are pointed out as contributing to the maintenance of over 20 million head of livestock, which supply in part at least the demands for meat, hides, or wool of every State in the union. The receipts from grazing, during 1913, though second to those from timber, were more than a million dollars, and showed an increase over the previous year in spite of the fact that the season was less favorable and the area reduced. Over 4 per cent more stock was grazed as the result of increased forage production and improvements in handling stock, especially sheep.

The system of range management employed by the forest service is held to offer hope of relief to the average citizen concerned over the dwindling supply of meat products and their alarming rise in cost. The national forests furnish abundant forage supplies, opportunity for the adoption of the best methods, freedom from livestock diseases, and protection in the enjoyment of all rights and privileges. Cattle from the Hayden national forest in Colorado took the grand championship prize at the National Live Stock Show in Denver, and in many cases the lambs from the forests topped the market. Losses from predatory animals are growing less as the wolves, bears, and other animals are killed off by forest officers.

GAME PROTECTION.

In connection with the grazing work, the forests serve to protect game; and the Wichita forest, with its buffalo herd, is one of the show places of Oklahoma. During the year the service co-

operated with the biological survey in placing over two hundred elk on various national forests. A large number of streams were stocked with trout fry.

CLAIMS ON THE NATIONAL FORESTS.

A large part of the report is devoted to a discussion of various kinds of claims under which title to land within the forests is sought. Nearly a thousand homesteads were taken up under a special act which provides for opening to settlement land suitable for agriculture. The report states, however, that some old homestead claims were instituted for the purpose of securing timber, and the same is still true of some mining claims.

"As attempted frauds under the mining laws are usually resorted to by interests in no way associated with mining, similarly the vast majority of homestead frauds are not chargeable to practical farming; but the appeal to popular prejudice has been made in the name of the mining industry and in the name of the farmers of the country."

MINING CLAIMS.

"The mining laws," Mr. Graves says, "afford the greatest cloak for land frauds in the national forests, and fraudulent mining claims are initiated by men and interests having no connection whatever with the mining industry." The mining laws, for example, have been used to cover townsite and timber claims, to secure farms and ranches, to secure mineral springs, sites for saloons, water-power sites, and stock watering places.

It has often been asserted that the national forests have operated as a bar to legitimate mining development. Figures collected in Colorado during the past year show that, if anything, there is more activity in prospecting on the national forests than outside.

"As with the stock industry, the proper relation of the forest service with the mining industry should be co-operative."

CLASSIFYING LANDS FOR USE.

One of the largest tasks of the service during the past year has been the

classification of lands within the national forests in respect to their highest future use. This work was undertaken during 1913 on a more comprehensive scale than ever before, because there was a specific appropriation for the purpose. Large areas are being classified where the amount of land chiefly valuable for agriculture warrants its being taken out of the forests, and it also takes care of areas on which detailed classification will disclose small areas suitable for agricultural development within the forests. The work is being carried on with the assistance of the bureau of soils and the bureau of plant industry. One result of this work was the elimination of 340,000 acres from the Nebraska national forest, 23,000 acres from the Rainier, in Washington, and 413,770 acres from the Deschutes and Paulina, in Oregon. About 300,000 acres in small isolated tracts were listed for settlement during the year. The areas now being examined for classification have a total area of about 3 million acres.

WATER-POWER DEVELOPMENT.

The development of water power upon the national forests increased rapidly during the year, particularly in California. It is the purpose of the service to encourage power development in every possible way, while safeguarding the interests of the public. The minimum output from the permits now in force is nearly 800 thousand horsepower.

Regulations now in force aim to safeguard the interests of the public, prevent speculative holding of power sites, provide for complete and proper development and continuous operation, secure a return to the Government for the privilege granted, provide a means by which States and municipalities may acquire power permits, and prevent unjust charges being placed on the consumer.

IMPROVEMENTS ON THE FORESTS.

The forests are being made increasingly accessible. More than 350 miles of road, nearly 300 miles of fire lines, nearly 4,000 miles of telephone lines,

and 2,600 miles of trails were built. The present value of all public improvements on the forests is somewhat over \$3,000,000, two-thirds of this amount having been put into lines of communication and protection.

Receipts from all sources for the year were slightly under \$2,500,000, showing an increase of 14 per cent over 1912, while expenditures for administration and protection were slightly over \$4,600,000, showing a decrease from 1912 of 2 per cent. It is pointed out that the work of examining and appraising timber prior to sale is seriously behindhand in some regions and that larger receipts from timber are contingent upon the funds that can be made available for this purpose. Although money for timber-sale work is necessarily subtracted from what is needed to protect the forests against fire, improved organization of the fire-protective system has increased its efficiency. Owing partly to favorable weather conditions the total fire loss was only \$67,000, less than 19 per cent of last year, which was the best to date.

The resident population of the forests is given as nearly 200,000, and the transient population as over 1,500,000. Recreation use of the forests is increasing greatly, and is in some places giving rise to the need for careful sanitary regulation in the interest of the 1,200 cities deriving their water supplies from streams protected by the forests.

MONEY FOR THE STATES.

Under existing law, 25 per cent of the gross receipts from the forests is paid over to the States by the Federal Government for the benefit of county schools and roads. An additional 10 per cent is expended in building roads and trails for the benefit of the public. About \$587,000 will be available for the States during the current year from last year's receipts, besides \$235,000 provided for in the road fund. Altogether, including special funds to Arizona and New Mexico, the national forests provided nearly \$867,000 to be expended for the benefit of the States in which they are situated.

APPALACHIAN FORESTS.

More than 700 thousand acres have been acquired for national forest purposes in the southern Appalachians and White mountains, of which considerably more than half was secured during 1913. These lands are being protected against fire, and the work of the Government has greatly strengthened local sentiment against forest fires. Some 250 miles of trail, to help in fire control, were completed during the year.

CO-OPERATION WITH STATES.

Co-operation with States in protecting forested watersheds from fire has brought about a co-operative field organization in fifteen States and the same arrangement is contemplated with three others.

FORESTRY ADDRESSES FOR STUDENTS

THE address on the Conservation of the Natural Resources of the Nation by Henry Sturgis Drinker, L.L.D., president of Lehigh University, and president of the American Forestry Association, published in the December number of AMERICAN FORESTRY, was an address delivered at the Tome Institute, of Port Deposit, Maryland, in October at the invitation of the Institute. Its publication in our December issue should

have been so credited but unfortunately the footnote stating that the address was delivered at Tome was dropped through an error while the article was going through the press. It is a type of forestry address setting forth elementary forestry principles in a way to reach and interest the intelligent young student. Dr. Drinker expects to follow this address with one at Oberlin College, Ohio, before the student body of that Institution on January 16th.

PUBLIC KNOWLEDGE OF FOREST ECONOMICS*

By E. T. ALLEN

Forester for Western Forestry and Conservation Association

DID you ever go into any project requiring your money and effort, together with considerable responsibility, without really understanding it? I suppose every one of us has. Most of us have invested hard-earned money in some enterprise because we couldn't find a single flaw in the argument of the promoter and consequently didn't have strength of mind to resist. We didn't really want to invest, even if it were a good thing. We hadn't the money to spare or, even if we had, we knew some other business better and would feel safer in it. We succumbed to persuasion and logic just because we were off our own ground and couldn't escape decently, but our hearts weren't in it. And however good that project was, it didn't succeed as well as it would have if we had understood it, known it good because we did understand, followed every development with intelligent interest, and put our money and enthusiasm behind it every minute accordingly.

Maybe we never actually distrusted the promoter, but we watched affairs mighty ready to criticise or sell out. We could even fail like martyrs if necessary, but we didn't help as though our own honor and judgment were at stake.

Now that's just what is wrong with forestry in America. We have propagandists with a perfectly irrefutable assertion that forest preservation is a good investment. The public either says "too busy today," and while not denying does nothing, or it says "here's your law (or appropriation or whatever is asked for); now make good and save the forests." But it doesn't know the business factors that govern the enterprise and cannot criticise or

help intelligently. Sometimes the propagandist doesn't know either. And forest preservation, unfortunately, cannot be conducted wholly by a business manager or board of directors. It is a mutual co-operative enterprise, requiring daily participation and ratification by all concerned. There must be an American forest policy which exists, not because a few of us say it should, but because a majority of citizens understand what is needed and why and proceed to put it into effect.

True, we are making rapid progress toward such a situation. Twenty years ago we had practically nothing. Now we have a great and efficient national forestry administration. Most States have some forest laws, some have good ones, a few are fairly liberal with funds. We have forestry associations and congresses. Lumbermen, once regarded as the opposition, are now showing the most rapid advance of all, for in less than ten years their systematic protection of private timber has grown from practically nothing to cover about 100,000,000 acres, with an increase of 3,000 per cent in five years.

But why does the Forest Service still have to fight for existence in every Congress, and at best be supplied with funds much less than private owners spend to protect adjoining lands? Why do many States have no forest legislation and few legislatures that are adequate? Why are there sections where lumbermen and public are so mutually suspicious that neither supports any real solution of a mutual problem? Why do we have to have forestry associations and conventions?

Evidently because the average citizen does not know much about the problem himself, in spite of all we have said and done. Result depended upon

human action depends partly upon the extent of desire for this result but more upon the extent of knowledge how to achieve it. We are trying to do as a minority what in its very nature must be an expression of the majority. We tell the average citizen it is his problem, that we have solved it for him, and that he should support the project. We are wrong. *We* cannot solve it or reduce it to a mere supportable project. We can give him the facts, but he must solve it by studying the relation of his conduct and the community's to his own welfare and then acting accordingly. Then, and only then, will Congress, legislatures, lumbermen, foresters and public be able to work together as they must work together, knowing that their policies are sound and commended, that success will be rewarded, and that failure will be punished.

We talk and write a great deal about methods, as though all that is necessary is to make foresters proficient and lumbermen interested. This is all right enough, but what is most needed is permission to apply what we already know. Knowledge and interest are far ahead of opportunity. Success depends chiefly upon having conditions under which they are encouraged. With such conditions you couldn't stop it if you tried.

Let us return to our average citizen who with his fellows constitute the majority of our population. Suppose that in his home town, where community relations are so closely under his eye that they are familiar and clear to him, a single industry employs a large proportion of the population, produces the chief share of all manufactured products, and pays an essential part of the taxes. Let us say it is fruit-growing, or dairying, or furniture making. This citizen would not think twice before conceding its necessity. Anything threatening its discontinuance would be a menace to be fought vigorously; anything promising to increase it would be encouraged. Town officials, chamber of commerce, citizens—all would work and spend in earnest for its continuance and development just as you have seen them do often when occasion of-

fered to promote enterprises of community advantages. No one in public life would dare do otherwise.

Moreover, they would know how. If it were a dairy community its average citizen would know pretty well what production costs, what prices are necessary, what improvements are feasible, what the State can and should do to aid and regulate, what public demands are reasonable and what are unreasonable.

The relation of forest industry to the State or nation is exactly that of our illustrative industry to our suppositious town and so is its relation to every citizen. Lumbering is one of the three or four greatest American industries—it is our greatest manufacturing industry—and forest products are used in almost every other besides being practically life essentials. Certainly it is second in usefulness to none except agriculture, and this would fare ill without its aid in many ways. The only reason the average citizen does not realize this and give it the same active and intelligent interest that he gives home town problems is that he cannot see it so clearly. The very immensity and importance of the industry causes its several processes of growing, manufacturing and distributing to be conducted separately and thus confuses the public mind. Different communities see different parts of the process and get no thorough grasp of forest economics.

In many a little German village the whole community sees the forest grown, cut, manufactured and used. Those who do not actually participate, serve or supply those who do. All use the crop or profit by what is sold elsewhere. There forestry needs no propaganda. The people could not understand the need of it, any more than of propaganda for raising wheat and making bread. Yet their situation is really no different—it is only more concentrated. Here, too, forest industry is an entity. Man needs wood in various forms. To make the earth supply it, employing such labor as is required to make it suitable and available for his use, is a business. Its permanence and service to the community; supplying the consumer, employing labor, using sup-

plies, and paying taxes, requires, like other business, perpetuation of the resource dealt with, economy in every process, and just payment by the consumer for service rendered.

Here is where we, who should be the teachers, are at fault. We talk too much about forests, as though they were an end in themselves. We might just as well talk only of land when trying to improve agricultural conditions, or water when urging the protection and propagation of food fishes. How can the average citizen understand forests? It is the business of producing and making them useful to him that he must understand—its place in the society under which he exists, the economic laws under which it exists. He must be brought to consider all forest production and all forest use as little or no different from the production and use of any other necessary crop, obviously to be encouraged and stabilized on a permanent basis profitable to all concerned. Whether he is a private citizen or a law maker serving private citizens, he must be fairly familiar with the factors which govern lumber prices, logging and manufacturing methods, the cost of growing and protecting the raw material. As long as he thinks an uncut forest is forestry, and that such forestry is good and all lumbering bad, there will be no real progress. Nor will he have lumber to use sometime when he needs it.

We are moving in the right direction slowly. Once propagandists made forestry an abstract problem of public or private conscience. They dwelt on the needs of posterity and urged present sacrifice as a duty. They practically said, "You are partly responsible for lack of forest protection. Forest destruction is bad for somebody's grandchildren. Badness is wicked. Therefore you are wicked. You need a sermon and we'll preach it." Nowadays we realize that abstract ethics do not influence human action as quickly as does fear of immediate personal injury. It does not offend our reforming instinct to add to our preachments of duty more vigorous and skilful appeals to human selfishness. We say "Do you

want to make more money? Then stop the other fellow from destroying dollars you would otherwise share. Forest preservation is a bargain-price insurance policy you can't afford to be without. It's cheap for a short time only. Look over our prospectus and invest."

Now forest preservation is prosperity insurance and insurance is good business. But it is a commodity that must be paid for in money and careful conduct. The new way is better than the old, but our prospectus is still so general it only gets a certain confiding class of customers. It needs to give more information about the business; information that will both convince the critical and make every customer another salesman.

Seek local arguments. If for the Atlantic coast, look up the pay-roll total for all lumbering and woodworking industries in your State and the total selling receipts from their manufactured products. The size of the revenue thus kept at home, but which will leave you if these industries have to move nearer some other sources of raw material, will probably amaze you as much as it will the public. Learn how much your consumers pay annually for all forest products and figure how much they would save if there were no import freight bills. Then learn the rate of growth of your own species and refute the popular belief that it is too slow to enable saving these sums to those now living. Do you know that Massachusetts is today manufacturing its fourth crop of white pine?

Learn your area of waste land, and, with the same definite growth figures to give your statements news value and convincing business accuracy, show what it might be earning the community by producing forest commodities. Calculate the tax revenues your existing forests bring, and that which forests on now waste land would pay, and show the consequent reduction of taxation on other property. On definite premises of area, growth rate, and conservative crop values show the revenue obtainable by the State from forest reserves of its own, balance this against the cost

of such a project, and prove that you could lower all taxation just as they do in Europe. Study the effect of deforestation on stream flow, use specific familiar examples, and convert the injury into dollars and cents. When you get figures in all these calculations, turn them into popular comparisons that are easily grasped.

If you live on the Pacific Coast, forget that white pine grows rapidly in Massachusetts and appeal to local pride by saying that here, undoubtedly, is the nation's woodlot, where climate and rapid-growing species give an advantage over the East which it is a business crime to leave ungrasped. Show that the area denuded by fire and use will produce an equally valuable crop in, say, sixty years, and that leaving this land idle is costing our five coast forest States about thirty million dollars a year. Add to this the loss by fire and show many millions altogether are being thrown away that might be distributed through every channel of industry. The lumber industry now brings about \$140,000,000 a year into the four northwest Pacific States. Show that this is more than they get from wheat, wool, fruit, dairying and fisheries combined. The Pacific Coast had more than half the nation's timber. Show how many billion dollars this will bring in if saved for manufacture. Show the wreck of industries that would follow its sudden destruction and point out that partial destruction means the same thing in proportion.

When a score of American citizens are endangered by an uprising in China or Mexico, no price is too great to pay for their protection. When a few hundred sailors went down in the *Maine* we were aroused to the supremacy of national effort—war. Are the lives of hundreds of men and women who meet fearful death in forest fires through American carelessness any less precious? Their sufferings any less cause for national horror? The neglect of our people to observe the same care with fire in the woods that they exercise at home, the refusal of Congress and legislatures to appropriate adequately for fire prevention, and the

leniency of our courts with fire law violators, all must be due to failure by those of us who are responsible for American education in these matters to impress a true comparison of values on the public mind.

As a nation we are engaged in forestry. Our national forests comprise nearly 200 million acres. Here is a stupendous task, involving the protection of existing supply, reforestation of denuded areas, and disposing of the product so as best to serve the people and to influence conservative management of private forests. To withhold funds necessary to do the work is letting an immensely profitable manufacturing plant lie almost idle, as well as in danger of destruction, to save the cost of fuel and watchmen. To mismanage it would be as bad or worse, for the one-fifth of our timber supply thus under public control cannot but influence profoundly the permanent wise management of the four-fifths under private control upon which we are still more dependent. Clearly all of us—lumberman and consumer alike—have most to gain from stable conditions for the fullest use and perpetuation of all our forest resources, regardless of ownership; from making all true forest land capable of earning such an income from forest production as, without being excessive, will insure its best management and consequent fullest service to community and nation.

And yet who can deny that we are without any accepted clear-cut, dependable, national policy which supports and finances this immense project with competent consideration of both public and private forests and their influence on permanent industrial development? The Forest Service can neither announce nor execute such a policy so long as there is every extreme of variance in the views not only of the States, whose attitude toward their own forests and forest industries has a profound influence, but also in Congress where any executive policy, to be dependable, must find sanction and support. Every Congressional session sees the whole subject debated from a dozen viewpoints, chiefly political, with a

marked lack of statesman-like treatment based on any real knowledge of forest economics. Besides unwillingness to provide adequate protection for the people's property we even hear advocated the turning it over to a dozen State legislatures that are doing still less with their own forest responsibilities. Ignorance or a desire for political effect has even urged immediate sacrificial cutting to break a mythical "lumber trust" when it should be self-evident that private competition is now at its keenest and that the government supply should be husbanded against the time when it may have some real effect on prices to the consumer.

Now all this is by no means chiefly the fault of Senators or Congressmen. There is nothing in it for them, except so far as it can be made to strike a responsive chord in their constituents. With the public half as well informed on the production of the lumber it needs as it is on the getting of its parcels by mail or the price of sugar, there would be an expression on an American forest policy that would leave no statesman uncertain. We cannot blame him if there is no such expression nor can we blame his constituents for not seeing that he gets it. It is because they have not been told the facts in convincing business language.

Come now to our States. Many have done nothing. Few have comprehensive far-seeing policies, covering their own opportunity on State-owned lands and adequate encouragement of good private management through efficient fire protection and just taxation. It is not enough for the reformer to present good laws and recognize bad ones. Why is there little trouble in passing laws for protection and advance of agriculture, horticulture and dairying? Not because these industries are more useful and deserving, but because people understand their governing conditions and see the point of such laws readily. The chief reason they do not so understand forest conditions is that the reformer himself makes forestry a creed and not a business.

In my opinion forestry will never succeed in the United States until it is

so closely allied with lumbering that neither forester, lumberman nor public makes any distinction. This is the case in Europe and everywhere in America that there has been successful progress. So long as the lumberman suspects forestry of being antagonistic, he will not help. So long as he does not help, the forester cannot talk intelligently to the public. After all, the private owner controls most of our forest area. His use of it, our use of it, and the effect of our relations upon our joint use of it, largely determine our forest destinies.

Were foresters in proper touch with the business end of producing forest products they would have the support of all lumbermen and jointly they would have an irresistible argument. Were forest economics understood and forest industry given its proper rating compared with other industries, suspicious lumberman and suspicious public would alike see a common object and make mutual cause to further it. A State with a hundred times more revenue to be expected from lumbering than from wool growing would not appropriate \$500 for forest protection and \$20,000 for coyote scalps. A community that applauds its chamber of commerce for getting a shoe factory and gives it a free building site would not carelessly burn up a forest capable of employing a thousand times as many men and then tax the owner so he cannot afford to hold and protect the land for a new crop. A State that is glad to see its farmers get a good price for wheat, even if it does use some flour, would not rejoice when its sawmills are forced to accept a low price for lumber. A lumberman who prefers to let his trees stand until Americans need them, rather than cut them at a loss for foreign export, would not be accused of conspiring to bleed the consumer any more than would a farmer who decides not to raise potatoes when they don't pay for raising. A country that applauds fruit growers for systematizing to assure reliable grades and intelligent marketing, sends publicly paid experts to help improve their orchards, and exempts them specifically from the Sher-

man law, would not condemn and seek to prosecute forest growers for attempting similar co-operative improvement of a business still more necessary to the community.

In short, the public would prefer to see all forest industry, public and private, on a sound business footing calculated to preserve it and its benefits to the community, and would expect to pay the cost of producing lumber from the tree to the yard plus the same fair profit that the public itself requires from its individual enterprises. And if this is true, the great need today is for teaching the principles of the business from start to finish. Every process, its cost, and its relation to other processes and to the final price of the product, should be common knowledge.

Nothing can be more inconsistent, so long as most of our forests are privately owned, and even the public forests must be manufactured for us privately, than to antagonize the lumberman whose help we must have by continuing such ignorance of his problems that we even treat him as an enemy. On the whole, forest industry probably surpasses any other in smallness of profit. Unusual opportunity has built some large fortunes, but for every one of these are many cases where the public has profited by failure. Nor is stumpage speculation any exception. Times are changed. Taxes, protection and interest are now compounding more rapidly than prices advance. The tendency is toward competitive over-production rather than toward monopolistic holding back of material. Few if any things are sold at so much less than their value as the trees of which lumber are made.

Whatever may have been in the past, when new supplies were easily available, the lumber producer now sees his industry dependent on forest preservation and his interest in this is as keen as ours. If he does not practice forestry it is, as Forester Graves says, for one or more of three reasons: first, the risk of fire; second, burdensome taxation; third, low price of lumber. This situation will not be relieved by threats of compulsion but only by learning what it costs to furnish forest crops and establishing a business-like policy accordingly.

When forest economics are as well understood as the economics of fruit or wheat growing, the suspicion which always confronts mystery will no longer manifest itself in prejudice which works to the consumers disadvantage. The private as well as public lumber producer, as a class, because he is honest and useful as a class, will be accorded the same respect and helpful sympathy as is accorded the farmer or engineer who develops the possibilities of utilizing our country and supplying its people. And he will be quick to respond.

So we always get back to education, the line in which forestry effort is the weakest. The ingenuity of theatrical, railroad, political and advertising agencies is proverbial. Activities of this kind are now regarded as business necessity. They are needed and legitimate nowhere more than in forest propaganda, which has nothing to conceal but everything to teach. Education is a matter of publicity and publicity is a trade. It cannot be practiced intuitively. Foresters and lumbermen must learn this trade.

* An address delivered at the Fifth National Conservation Congress, November 20, 1913.

FORESTRY CONFERENCE AT VANCOUVER

IN describing various movements toward securing better forestry conditions, chiefly of improved protection against forest fires, E. T. Allen, forester of the Western Forestry and Conservation Association, said at its annual meeting held in December at Vancouver, B. C.:

"The National Conservation Congress, a yearly gathering of prominent and influential people which has possibilities of much power, good or bad, has in the past offered us some opportunity but not as much as we wished. This year, through co-operation suggested by us last fall to its officials and the American Forestry Association, it not only gave forest economics a large share of its main program but also provided for a separate sectional meeting on forestry and lumbering which was a tremendous success. Ten expert committees were appointed last spring to bring in reports on forest legislation, taxation, fire methods, utilization and like practical subjects and \$5,000 was contributed by the American Forestry Association to give them publicity. We were invited to direct much of this work. The result was not only to get for the first time a broad practical treatment of all these subjects before the public in a form beyond suspicion of selfish interest, and with western conditions fully considered, but also to cement an alliance with all workers along these lines in the country so as to keep up such co-operation hereafter in short, our association now has national as well as western influence.

Mr. Allen went on to tell of the work of his association by saying: "We have at last arrived at a point where our organization affords absolute fire protection in the normal season. To put it another way, we can practically insure our timber for the normal year at the present price of supporting the organization we have developed. For suc-

cess was by no means due wholly, or even chiefly, to weather conditions. Representative private and official protective agencies throughout the Pacific Northwest States were asked to submit a comparison of this season's hazard with that of other seasons. While there is some local variation in such comparison, the consensus is that while 1913 hazard did not tax 1913 facilities overhard, this was because facilities were improved. The season itself was of average difficulty. Montana reports it 'as great or greater than usual'; Idaho 'average, excepting the unusually dry seasons of 1905 and 1910.' Washington, 'not as bad as 1902 and 1910, or quite so bad as 1911, but worse than 1912 and averaging with other past years'; Oregon, 'about an average year, taking all together.'"

President A. L. Flewelling, in an incisive address and speaking from the viewpoint of a practical man, said considerable of particular interest to foresters:

"The subject of forestry in the last decade has engrossed the public mind more than any other of the live issues discussed. It has been heralded from the pulpit, the rostrum and through the public press of all civilized countries, and the thought that in time the world would be denuded of its forests and verdure, with all the dire calamities which would logically follow, has been scattered broadcast by impassioned utterance and scarehead articles until the public mind has almost reached a condition of panic. A class of hysterical people have been handling the subject, who never owned any trees or ever looked a payroll in the face—all good people according to their lights, but more often insane than sane in their statement of facts and conclusions of results. They have so wrought upon the public mind that the subject has become chaotic, and it has become nec-

essary for the people who are really interested in the subject as protectors of trees to organize their forces into an intelligent association, consisting of the owners of timber or their representatives, be that ownership private, State or national. These conditions supplied the primal reasons for the birth and growth of this great organization.

"This association, being made up of the bulk of the intelligent, organized effort for the prevention of forest fires in the territory which it covers, has been enabled to draw to itself most of the potent factors necessary to its success by the natural laws of gravitation. We began by placing attractive literature on the subject in all the district schools, thereby educating the children along right lines, and they in turn educated their parents. Now the first smoke that appears is instantly reported to one of our rangers by the first person that discovers it, over some unit of the network of telephone lines which we have constructed through the timbered district, and one or more of the great army of workers jumps on the fire and puts it out. Our rangers report to the country newspapers, and through this medium a live interest in the subject of forest protection is steadily kept in the public mind. The careless camper and logger and the heedless far-

mer is kept reminded of the duty he owes to the public and to the laws of the land regarding the unlicensed fires he sets in carrying on his operations.

"We recognize as a self-evident truth that trees were created for the use of man, and that when a forest becomes ripe it should be cut without waste and used, so that nature can get to work on the new growth and perfect a new forest for future generations. We are not so much concerned in saving timber for generations yet unborn as we are in saving our present crop from useless destruction, harvesting it intelligently and starting the new crop growing and protecting the new growth. Nature will still grow new trees if we keep the fires out and just let her work. Prevent and put out the small fire and you will have no large fires."

Reports on fire conditions in their various districts were made by officials of the various fire-protective organizations of Oregon, Washington, California, Idaho, and Montana, as well as Government officials of the United States and Canada, and there were several addresses on other phases of forestry. There was a most gratifying attendance both from the United States and Canada, and the conference was in every way a splendid success.

THE BLIGHTS OF CONIFEROUS NURSERY STOCK

A NUMBER of different blights, concerning which little has been known, do considerable damage to conifers in nurseries in the United States, according to Bulletin No. 44, Bureau of Plant Industry, U. S. Department of Agriculture. The increasing amount of forest planting and the danger that imported stock will bring in serious tree diseases make it especially important that methods of controlling these blights be found in order to encourage the growing or planting stock in this country.

Sun scorch is the commonest summer trouble among nursery stock. The

roots of the plants affected die before or at the same time as the tops. Death is caused by excessive water loss. It usually occurs when the air is hot and dry and the soil around the roots is dry. The disease is worse on sandy soils in crowded beds and on raised parts of beds. On sandy soils it may kill suddenly and in definite patches. Successful preventive measures that have been tested by the department are watering, shading and avoidance of crowding. In nurseries located on mineral soils the humus content should be increased.

Winterkilling, another disease, causes

the tops of the plants to dry when the soil is frozen so that the plants cannot take up water. The preventive measures most used consist of a light straw mulch on the beds and windbreaks.

The tops of plants affected by the mulch-blight die in winter. This happens while the mulch is still on or occasionally just after it is removed. The roots do not die till sometime after the tops. The immediate cause of death is unknown. The disease may be prevented by avoidance of heavy, close mulches. Spraying with Bordeaux mixture just before the beds are mulched in the fall may also be of value.

There are a number of needle-destroying fungi, some of which are cer-

tain sooner or later to cause damage in the nurseries in the more moist parts of the United States. They have so far done little damage in our nurseries, and have been little studied. Spraying with Bordeaux mixture at the proper time will presumably prevent damage from any of them. The proper times for spraying have not yet been determined. The importation of European stock should be discouraged in order to avoid bringing parasites which have not yet reached this country.

A great deal of blight occurs in red cedar seedlings and transplants. The cause and methods of prevention are unknown. Shading, watering and frequent spraying should be tested.

MANY USES FOR BIRCH

FROM furnishing material for a canoe in which to hunt whales some hundred-odd years ago to supplying New England factories of today with 11,000 cords of wood annually for shoe pegs and shanks is, according to the Department of Agriculture, only part of the services the birch tree has rendered and is rendering the people of America.

Sir Alexander Mackenzie, the department states in a bulletin on the uses of birch, hunted whales in a birch-bark canoe. The animals were found at the mouth of the Mackenzie River. He failed to strike the game, and concluded that it was probably for the best. While the canoes are frail, it is pointed out that the bark of which they are made resists decay longer than any other part of the tree.

It would be difficult to estimate the value of the service of the birch-bark canoe in the discovery, exploration, development, and settlement of the northern part of this continent. From the Arctic Circle to the Great Lakes, and southward, for a century and a half, that light but exceedingly strong and serviceable vessel threaded the lakes and rivers, bearing trade and carrying civilization where no other boat could

go. The French explorers and missionaries made journeys of hundreds of miles in these canoes, often carrying cargoes which would seem beyond the capacity of such frail vessels.

The range of uses to which birch wood is put is surprisingly large. The articles into which it goes range from church pews to kitchen tables, and from organ pipes to newel posts. We may have our first sleep in a birch crib and our last in a birch coffin. The spools on which we get our cotton and silk thread are birch spools, and the lasts on which our shoes are made are likely to be birch lasts. The largest of the spools hold 12,000 yards, the smallest 20 yards. The wood's beauty, strength, and rigidity make it prominent as a material for musical instruments, and the same qualities bring it into extensive use for flooring.

Many people have an idea that shoe pegs have nearly passed out of use, but the amount of birch previously mentioned as made into pegs and shanks yearly in New England seems to disprove this notion. Birch, the department says, is often put on the market in imitation of other woods, and we may open many a door, sit on many a chair, and write on many a desk

which we imagine to be mahogany, but which is really birch stained to resemble the genuine article.

Nine species of birch grow in the United States, but sweet, yellow, paper, and river birch are those most used. About 45,000,000 board feet of the wood finds its way to the market yearly. Paper birch is one of the few Ameri-

can species with a hold on the forest stronger than it had when America was discovered. Large tracts are now covered with this birch where there was little of it a century ago. It comes in after fire, and some tracts it has taken possession of cover hundreds of square miles.

MAPLE IS HOLDING ITS OWN

THOUGH at one time in the early history of the country an average of 6,000 maple trees were destroyed in clearing the ordinary New York or Pennsylvania farm, maple is today one of the most widely used and valuable native hardwoods.

A bulletin on the uses of maple, just issued by the Department of Agriculture, states that the wood finds place in an enormous number of articles in daily use, from rolling pins to pianos and organs. It is one of the best woods for flooring, and is always a favorite material for the floors of roller skating rinks and bowling alleys. It leads all other woods as a material for shoe lasts, the demand for which in Massachusetts alone exceeds 13 million board feet annually.

Sugar maple stands near the top of the list of furniture woods in this country. The so-called "birds-eye" effect, the department explains, is probably due to buds which for some reason can not force their way through the bark, but which remain just beneath it year after year. The young wood is disturbed each succeeding season by the presence of the bud and grows around it in fantastic forms which are exposed when the saw cuts through the abnormal growth.

Maple is one of the chief woods used for agricultural implements and farm machinery, being so employed be-

cause of its strength and hardness. All kinds of wooden ware are made of maple, which holds important rank also in the manufacture of shuttles, spools, and bobbins. It competes with black gum for first place in the manufacture of rollers of many kinds, from those employed in house moving to the less massive ones used on lawn-mowers. Athletic goods, school supplies, brush backs, pulleys, type cases, and crutches are a few of the other articles for which maple is in demand.

Seven species of maple grow in the United States, of which sugar maple, sometimes called hard maple, is the most important. The total cut of maple in the United States annually amounts to about 1,150,000,000 feet. Nearly one-half is produced by Michigan, with Wisconsin, Pennsylvania, New York, and West Virginia following in the order named. Sugar maple, says the department, is in little danger of disappearing from the American forests, for it is a strong, vigorous, aggressive tree, and though not a fast grower is able to hold its own. In Michigan it is not unusual for maple to take possession of land from which pine or hardwoods have been cut clean, and from New England westward through the Lake States and southward to the Ohio and Potomac Rivers few other species are oftener seen in woodlots.

The total amount of land purchased in the eastern States for Federal forests is nearly 800,000 acres. So far the principal work on these areas has involved their protection against forest fires.

NATIONAL ORGANIZATION TO STUDY FOREST INSECT PROBLEM

THE enormous losses due to forest insects have led to the formation of a society for the advancement of forest entomology in America. The members of this society hold that the work of insects has not received the attention which it deserves.

Henry S. Graves, U. S. Forester, the newly elected president of the society, on being asked about the purposes of the organization, said that they were, in general, to call attention to the part which insects play in forest problems. "We have had," he said, "widespread and specific interest in insect pests such as the San Jose scale and the boll weevil, which affect all of us as to what we eat and what we wear. Forest insects through their destruction of timber increase the cost of a necessity which enters quite as much into the daily life of the individual as do the products of the field and orchard. If the importance of the protection of our forest resources from insect depredations is generally recognized, a large part can be prevented or avoided.

"Right now in the national forests the bureau of entomology and the Forest Service are cooperating to stop insect ravages by discovering their beginnings, and stamping them out. A few isolated trees attacked by insects may form the nucleus of a mountainside devastation quite as serious as that from a forest fire. The opportunity for combatting insects, however, is in one respect better than that in the case of a fire, which runs rapidly, because it takes several years for an insect devastation to spread until it becomes of such proportions as that which overspread the yellow pine forests in the Black Hills in 1906. Watchful care on the part of forest officers, lumbermen, and private individuals will make it possible to catch these infestations before they get a good start. By cutting and burning

the trees, or stripping off the bark, the insects can be killed. As in all such cases, an ounce of prevention is worth a pound of cure."

"Who make up the membership of the organization?" was the next question asked of Mr. Graves.

"It is open to anyone interested in the subject," Mr. Graves replied. "It seems to me that the relation of forest insects to forest protection touches almost every one. Of course, we expect that new members shall be recommended by the present membership, which is made up largely of persons who have studied the forest insect problem at first hand. In order, however, that the objects of the society shall be kept foremost, it is required that at least four of the seven officers must be chosen from among professional forest entomologists. It is expected that honorary vice presidents representing Federal, State, and private interests will be elected to promote the objects of the organization in many localities through the country."

"How will these objects be attained?"

"In the first place, the objects of the society are largely educational. As in all questions of large public importance, the main idea is to give the public an opportunity to know just how important they are. In the second place, the society will form a clearing house for information, and its meetings will discuss the most advantageous methods of insect control. Take, for example, the ravages of the gypsy moth and the brown-tail moth in the Northeastern States. If we can bring about a general knowledge of these insects and of the harm they do, and are able to instill into the mind of the individual the necessity for and the proper methods of their control, how much easier it will be to combat them than when the work is confined only to governmental agencies!"

TIMBER ESTIMATING IN THE PACIFIC NORTHWEST

By H. J. BROWN

TIMBER estimating varies from the rapid, inexpensive preliminary to the detailed, elaborate, costly method of the total tree count. In making a preliminary, one may run once through a 40 by either estimating the trees in a given strip or by generally sizing up the timber. In making a total tree count it is necessary to run through a 40 8 or 12 times, counting the trees on each side of the compass line for a sufficient distance to cover the entire area.

In the wide range from the one-run, preliminary to the total tree count with its 8 or 12 times through a 40, there are any number of systems, limited only by the ingenuity of the estimator, so that when one reads of a new system having been developed it is not to be taken too seriously.

The first estimating on the Pacific Coast was done on a basis of one run through a 40, but as the timber increased in value more care was taken with the estimating until now the basis is a 2, 4 or 8 times run through a 40, at a cost of from 12 cents to \$1.00 per acre.

The most frequent systems used are:

(1) Counting the trees either in strips or in circles and obtaining the total by multiplying the average tree by the number of trees.

(2) Counting the trees either in strips or in circles and treating each tree as a unit to obtain the totals.

(3) Taking a tree here and there as a base and by much criss-crossing of the area between the compass lines seeing the entire acreage. This plan is subject to a great many variations and is used mostly by men of long experience in the woods. It is considered by many largely a matter of intuition. Nevertheless, its accuracy at times is almost startling.

The strip and circle methods are

fundamentally the same, as they are both based on the counting of trees. Some prefer the circle method, as they can count the trees with more accuracy while standing on one spot than while moving and counting them in a strip. This, however, is largely a matter of training. The strip method is the only one used when making an entire tree count. The difference in the method of estimating lies in counting the contrast and then multiplying by an average tree in contrast to estimating each tree and adding for the total.

To obtain the amount in individual trees is also largely a matter of personal choice. There are two general systems:

(1) Certain "rules of thumb" developed by the individual cruiser and which have been found to produce satisfactory results.

(2) The use of the volume table which is based on an ideal tree, thereby making it necessary to have the trees conform to the volume table and not the volume table to the tree. This table is based on diameters running from 12 to 90 inches, or higher, carrying a different number of logs and a varying taper for each diameter class. In other words, adding the contents of the scale of the individual logs to get the contents of the tree.

For example:

	4 logs or 128 foot tree		3 logs or 96 foot tree	
	Taper	Contents	Taper	Contents
	32" log	B. M.	32" log	B. M.
Butt	3"	4,784	3"	3,960
Diameter	4"	4,010	4"	3,458
36"	5"	3,316	5"	2,994
	6"	2,722	6"	2,568

To use this table one must measure down trees for taper and length and use the volume table accordingly. The diameter of standing trees can be determined by the use of a diameter tape.

Whether the estimate is to be based on a 2, 4 or 8 times run through a 40 is optional with the owner or prospective buyer. A 2 times run through a 40 is made at intervals of two tallies or 660 feet, counting trees on either side of the tally line for a distance of $31\frac{1}{2}$ steps or 5 rods and multiplying the amount by 4 for the total. A 4 times run is made at intervals of one tally or 330 feet, doubling the amount for the total.

In an 8 times run tally stakes are set by a survey crew which keeps ahead of the estimators. These stakes are set along the section line and are used to keep the compassman in alignment. The boundary of the 40 (or $1/16$ square-mile lines) can be carried by the estimator and the compassman can carry the lines, and a survey crew is not used except to run the section lines where there is an indistinct survey.

In making a 1, 2 or 4 times run, whether the trees are counted in strips or circles, there is no fundamental difference in the basis of the estimate. The difference lies in using the individual multiple for the number of trees in contrast to estimating the individual trees and adding for the total.

The following diagram is based on an 8 times run through a 40. Estimates are run on the fractional tally lines.

4th tally or $1/16$ line
$3\frac{3}{4}$ tally line
$3\frac{1}{4}$ tally line
3d tally line
$2\frac{3}{4}$ tally line
$2\frac{1}{4}$ tally line
2d tally line
$1\frac{3}{4}$ tally line
$1\frac{1}{4}$ tally line
1st tally line
$\frac{3}{4}$ tally line
$\frac{1}{4}$ tally line

Boundary line of 40.

In making a detailed estimate of a large tract, if a number of crews are employed, some estimating firms have a head estimator check up the work of the other estimators. In such instances

it is well to have a well perfected system under which all the crews can work in order to produce similarity of data and reports. The head estimator is held responsible for the work of all the estimators. As the work is done under one system, it is much easier to prevent errors or adjust any dispute that may arise.

The foregoing shows that timber estimating has developed from a loose individual idea to a closely detailed system. None of the methods evolved are obsolete or untrustworthy, as the method to be used depends upon the circumstances and object of the cruise, as well as upon the individual making the estimate. A buyer thinking of entering a certain belt of timber and wishing to obtain general information as to the kind and character of the timber does not care to spend much money, and so sends an estimator on a preliminary cruise for this information. The estimator may work alone by simply running along section lines and getting a general idea, or he may have a compassman. If his report is satisfactory a more detailed examination is made. Where stumpage is \$3.00 and \$4.00 or higher, the buyer will probably want a detailed tree count.

Bonding houses now require a careful, detailed cruise by well-known estimators in order to offer assurance to their clients as to the exact amount of timber under mortgage.

In connection with the estimating, a complete contour map should be made, based on barometer readings, which will show creeks, roads, trails, etc. It will also show the outlet of the timber and the best location for possible railroads and camps.

The report form on which the final estimate is made is largely a matter of choice. It varies from the simple form with the section divided into 40's—the amount in board feet found on each 40 to be inserted—to the elaborate form giving the number of trees and their amount, the average length, size and amount per tree, and the different percentage of grades found on each 40. These reports are worked up from the

cruiser's field notes, which are copied on forms while in the field. On large tracts the specific report for a 40 or a section is supplemented by a general report covering the tract as a whole and taking up in detail the quality of the timber, the cost of logging and the general desirability of the tract. This general report is of great value and often covers the ground so thoroughly

that the detailed reports are not consulted.

With the increase in the value of timber there is a growing recognition of the fact that timber estimating must be put on a more scientific basis. Up to this time, however, efforts to make it conform to certain prescribed theories have not been entirely successful.

FIRE PROTECTION ON THE OZARK NATIONAL FOREST

By FRANCIS KIEFER, *Forest Supervisor*

UNDER this same title there appeared an article in the August, 1912, number of AMERICAN FORESTRY, a description of the fire protection system installed on the Ozark National Forest. It is the purpose of this short paper to briefly discuss its results.

To summarize the scheme, the forest supplied with ten towers, is divided into six ranger's districts, which are in turn subdivided into fire-fighting units in accordance with natural and artificial features such as ridges, streams and roads. In each unit a reliable settler is chosen who is well situated for quickly reaching any fire which may be reported to him either by the ranger or tower lookout. This fire-fighter is supplied with fire rakes, sprinkling buckets and wooden brooms, required for extinguishing. In this way the regular force, which on account of limited appropriations is kept small, is supplemented in time of danger.

After a year's trial, the system has shown its value to be in the ability of the district rangers to (1) place fire-fighters at a fire in its incipency, (2) to relieve themselves of attending every small fire, thus saving themselves for the more critical situations. In the Ozark region fires are numerous, due to incendiarism growing from an old custom of the settlers to burn annually to "improve the range," "destroy varmints," "improve health conditions," and kindred superstitious reasons.

The direct benefit of the first feature of value in the system is that the acreage burned over annually is largely reduced although the number of fires has not been diminished. This is shown by the following extracts from annual reports:

Year	Number of Fires*	Acreage Burned	Remarks
1911	145	87,723	Without tower system
1912	241	43,933	With " " "

*Presumably the number of fires is greater in 1912 than in 1911, because all fires were discovered and reported, while in 1911 under the riding patrol system some fires were not discovered.

The one great fault of the system has proven itself to be the difficulty to procure a reliable fire-fighter for each fire-fighting unit. This weakness, however, is expected to be remedied in 1913 through a chief fire-fighter whose sole duty it will be to maintain a strict vigilance in troublesome units.

The speedy action which is obtained by the towers in locating fires and sending men to them is shown by the following:

Name of Fire	Time Discovered	Distance of Fire from Tower	Time Fire-fighters Arrived at Fire
Sylamore No. 80	11:30 a. m.	10 miles	12:15 p. m.
Blue Mt. No.	1:00 p. m.	9 "	2:20 p. m.
Pleasant Hill No. 5	1:00 p. m.	8 "	2:30 p. m.

While setting forth the foregoing results of the protective system it is op-

portune to mention the findings in experiments with various forms of fire-fighting equipment. The abundance of water in the many running streams of the Ozarks has stimulated efforts to devise means for its conveyance to fires. Since packing is unknown on the forest animals, metal tanks were soon abandoned. Collapsible canvas bags designed to be thrown over ordinary Texas saddles and to be carried on a and impracticable through lack of pack man's shoulders have been the object of development. Where water is plentiful there is no question as to the feasibility of conveying it in sufficient quantities on horseback to be of immense benefit in combating fires, but the difficulty which has not been overcome is the prevention of leakage at seams and through the fabric itself. Various weights of canvas, combination of weights, water-proofing liquids, and methods of construction have all failed. It is essential that leakage be prevented because during cold weather both man and beast must be dry. The South African water bag, which has proven its merit in the Forest Service, is unsuited to the purpose since its object is to allow slow evaporation of its contents for cooling purposes as in the case of the earthen Mexican water bottle. The only solution is a rubber bag

but the price is prohibitive as shown by the following quotations from a large manufactory of rubber goods.

Large double horse pack bags, \$30.00 to \$40.00 per pair.

Small shoulder pack bags, \$15.00 to \$20.00 each.

The method of the application of water, however, has been solved for extinguishing burning logs, stumps, etc., safeguarding back fire line when within easy reach of a water supply. For this purpose the standard Forest Service canvas water bucket has been modified by the attachment of a canvas hood across three-fourths of the top with perforated crescent-shaped metal plates at the joint edge. With this contrivance, which is light and can be carried in great numbers to a fire, water can be readily applied as with a garden sprinkling can.

In making a fire line in hardwood leaves two implements have proven their worth, the ordinary so-called five-tined potato digger, hook or rake, which is a standard agricultural tool, and the wood broom, a specially constructed device made from second growth hickory or white oak. The broom is formed by splitting the lower end of the handle and spreading the splits fanwise by means of wooden bars and light wire to hold them.

ELK FROM YELLOWSTONE PARK

ALMOST 2,000 more people visited the Yellowstone Park in 1913 than during the season of 1912, according to the report of the Superintendent, recently made to Secretary Lane. The tourist travel has increased 45 per cent since 1906, and was heavier in 1913 than ever before with the exception of 1909, when the Lewis and Clarke Exposition was held in Portland.

"The winter conditions for wild game were again excellent," says the Superintendent. "With plenty of grass, and the snow remaining soft so they could paw through it to get food, the elk, deer, antelope and mountain sheep wintered well and with but little loss."

"During December, January, February, and March, 538 elk were captured in the park near the northern entrance and shipped for stocking public parks and ranges as follows: 80 to Kings County, Wash.; 50 to Yakima County, Wash.; 40 to Garfield County, Wash.; 50 to Shasta County, Cal.; 50 to Pennsylvania for Clinton and Clearfield counties; 50 to West Virginia; 80 to Arizona; 25 to Hot Springs, Va.; 3 to City Park, Aberdeen, S. Dak.; 4 to the City Park at Boston, Mass.; 6 to the City Park at Spokane, Wash. One hundred were captured and shipped under direction of the Department of Agriculture, of which 25 went to Sundance, Wyo.; 25 to Estes Park, Colo.;

25 to Walla Walla, Wash.; and 25 to points in Utah. The cost of capture and loading on board the cars at Gardiner was \$5 per head, which was paid

by the States and parks receiving the elk. The loss in capturing and up to the time of delivery at their destination was but 22 animals out of 538 shipped."

FOREST NOTES

In spite of the fact that New York leads all the other States in the amount of its State Forests and has done more planting of idle land than any other State, New York as a whole is decidedly apathetic along Forestry lines, especially in the matter of the proper use of its forest resources. The State College of Forestry feels that the only way of improving the situation is to carry through an aggressive campaign of education along forestry lines beginning with the children of the State. The question of how to educate the child along forestry lines is a bit perplexing in view of the complexity of the curriculum in grammar grades and high schools. Too often schools are burdened with too many courses or have all too little time to teach work outlined for present courses. The College of Forestry by no means urges the insertion of a separate course in Forestry. It does believe, however, that the children of the State can be thoroughly acquainted with the importance of Forestry, its place in our economic life and its possibilities as a State and National industry by simply injecting the Forestry point of

view into the various courses given in the lower grades.

At the recent meeting of the Pocono Protective Fire Association of Monroe County, Pennsylvania, the keynote of the report of the board of directors was the need for a widespread education of the people of the community. The directors realize that effective work in keeping down forest fires depends much more upon the active interest of the resident population than upon the contributions of a few owners of extensive tracts of woodland. So a movement is now under way to instruct the residents of the Pocono region as to the need and value of taking care of the woods, and in this manner to extend the limits of the activity of the association by taking as many persons as possible into membership, without regard to the holding of forest lands. The use of posters, the circulation of tracts, and newspaper articles are expected to influence gradually the adult population, while the school children are being taught the lesson of forest conservation through a systematic course of instruction, under the hearty co-operation of the County Superintendent.

STATE NEWS

Maine

The Forest Fire Protective System of Maine, which was among the first established, has been greatly improved the past season by the addition of fifteen new lookout stations. This brings the number of stations up to forty-three, and Forest Commissioner Blaine S. Viles plans to erect six or more new stations the coming year. The fire loss on the wild lands of the State for the past season amounted to only \$29,212.00. As this area includes nearly ten million acres of forests, with an estimated value of from seventy-five to one hundred million dollars, it

will be seen that this loss is comparatively nothing.

While the season was not a particularly dry one, except for short periods of drought, there were no heavy rains, and a great many fires started which would have caused heavy damage had they not been promptly extinguished.

The Lookout Stations reported three hundred and sixty-five fires during the season, and patrolmen seventy-one.

While it is realized that there may be a year of such extreme drought that even the most advanced measures may fail to protect

the forests from fire, the people of the State feel that the system now established is of great value.

A large number of tools, etc., for fighting fire have been distributed the past season and about seventy miles of additional telephone lines constructed.

North Carolina

The great interest North Carolinians feel in securing the wisest use and most efficient control of all our natural resources, whether the property of the individual, of the State, or of the Nation, was shown by the large and representative delegation which attended the National Conservation Congress recently held in Washington.

At the first meeting of the State delegation, called for the purpose of selecting officers, Mr. Z. W. Whitehead, of Wilmington, was elected State Vice-President, and Mr. J. S. Holmes, of Chapel Hill, State Secretary for the ensuing year, while Col. W. A. Blair, of Winston-Salem, was elected a member of the Resolutions Committee.

Of the seventeen delegates present at the Congress four had been appointed by Governor Craig to represent the State, four represented the North Carolina Forestry Association; the University of North Carolina, the State Department of Agriculture, and the National Lumber Manufacturers Association each sent one delegate, while the remainder represented their own home towns. The variety of interests represented is seen in the fact that six delegates were lumbermen or timber users, five were teachers or scientists, two were bankers, two were large land-owners, and one was a prominent club woman.

The unanimous attitude of the delegation was expressed in the following resolution, adopted at their first meeting:

"Resolved. That it is the sense of the North Carolina delegation and they hereby request their representative on the Resolutions Committee to vote for strong Government co-operation in the matter of conservation, believing that it is only through the Government that certain conservation policies can be successfully carried out."

The newly-elected Vice-President, Mr. Whitehead, in speaking of the Congress a few days later, at the monthly meeting of the North Carolina Pine Association at Norfolk, said that "nation-wide benefits would result not only to forestry and timber, but our water-power sites and other national resources would be conserved and advanced as well as protected and safeguarded." He gave it as his opinion that this institution, *i. e.*, the National Conservation Congress, "should be heartily supported and that the lumber people shall take an active interest in shaping its policies in the future."

The North Carolina delegation in all test votes, at which times there were always from nine to eleven delegates present, went definitely on record as favoring strong govern-

ment control of water powers, and only one vote was cast against endorsing the advanced and patriotic stand of Mr. Pinchot on this subject.

The tone of the State press, in commenting on the Conservation Congress, thoroughly endorses its action; while the lumber journals throughout the country are unanimous in praise of the congress, its stand and accomplishments.

New York

The regular session of the New York State legislature has passed a concurrent resolution amending the Forest Preserve section of the constitution. The present provision prohibits any direct use of this enormous area. The proposed change will permit the removal of mature, dead or fallen timber, or permit thinning; authorizes the leasing of camp sites; the construction of necessary roads and trails; also the sale of isolated parcels of land without the Adirondack and Catskill Parks. This provision will necessarily have to be adopted by a subsequent legislature and submitted to a vote of the people before it is active.

Governor Glynn has already stated that he is very much interested in an extension of reforestation, better forest-fire protection, and the purchase of additional lands for Forest Preserve purposes.

Massachusetts

At the annual meeting of the Massachusetts Forestry Association there was discussed the advisability of obtaining State Forests in Massachusetts, and a bill will be presented to the legislature this year asking for \$50,000 a year for five years, with which to purchase wild and waste land in Massachusetts. It is believed by the Association that this will be the means of bringing into the productive list much of the now worthless land in the State which is yielding nothing for the owner or for the State through taxation.

Several important addresses on State Forests as applied to Massachusetts were given. Prof. W. D. Clark, of Amherst, talked on "State Forests in Massachusetts as a Business Proposition." Philip T. Coolidge, in his address on "State Forests in the United States," gave very interesting data concerning the lands owned and held in the various States as State Forests. William P. Wharton talked on "State Forests as Bird Sanctuaries," giving specific examples from Germany. State Forester F. W. Rane summarized the work of his department to date, showing what had been done toward procuring State-owned forest lands. The meeting has aroused considerable enthusiasm on State Forests, and we believe that it will have direct bearing on the passage of the bill which is to be presented to the incoming legislature.

The present status of the White Mountain

National Forest was discussed at length, and it was shown that perhaps through some misunderstanding on the part of the National Forest Reservation Commission regarding public sentiment in New England in connection with the management of this forest, that reasonable progress in the purchase of those lands has not been made. In order to dispel any such misunderstanding, this Association placed itself on record as favoring the management of the forests in the White Mountains along the same lines as other national forests.

The outlook of the Association for the coming year is brighter than ever before. The Association now has twenty-four branch associations and a membership of 3,400, having increased its membership the past year by 1,491. An average of six foresters have been kept in the field giving advice and doing practical work for the past year, and this work will be continued.

From the standpoint of legislation the Association is proud of one bill which passed the legislature through its efforts this year. The Public Domain Act was so revised as to give towns and cities in the Commonwealth the right to own and manage municipal forests, and already some of our towns are taking advantage of this measure. It is hoped that in the near future many other towns and cities will be persuaded to acquire lands under this law.

Pennsylvania

The Central Pennsylvania Forest Fire Protective Association, of which J. M. Hoffman was the organizer and is the forester, has just finished its first year's work. Natural regeneration on the 350,000 acres that now comprises the area of the association's work, in spite of recurring fires, is now at least 60 per cent perfect.

Lands which to the casual and experienced observer seem to have nothing growing on them except brush or worthless trees, one finds on close examination to be growing maple, chestnut, red and white oak, and others of the most valuable tree species. The only great hazard preventing these young trees from becoming valuable timber is fires.

For the protection of the seven million acres of the State land particularly subject to the fire hazard, and about seven million additional acres of land in farmer's wood lots or in communities more thickly settled where the damage done by fires is less, the greatest amount of money ever spent by the State was \$50,000 for two years work.

Mr. Hoffman says in his report:—This money until our work begun had been spent only in actual fire fighting. Last spring and again this fall we were able to induce the Commissioner of Forestry to allow us 24 patrolmen at \$25.00 per month for two months' service. There is this provision for patrol in our Fire Warden act but until our activities began this was never made operative by the Forestry Department.

I held several meetings with land owners and organized an association, each land owner pledging himself to pay an assessment on an average basis. My plans were thus laid to secure the aid from the Federal Government provided for through the Weeks' law. It must be remembered that with the exception of one other association in Monroe County, whose activities cover about 60,000 acres, our work is the only systematic effort made at Forest fire protection on private lands in our State.

I am omitting in this statement the very worthy effort made by several co-operations and individuals for the protection of their own lands which is very difficult, indeed, when all owners of consecutive areas of land do not join for their mutual protection. I am not including in this discussion the 900,000 acres of land owned by the State, except to remark that in many cases where the State lands adjoin or are surrounded by private holdings the protection of both private and State lands is necessary to protect either. Organized forest fire protective associations adjoining State lands will greatly aid the State Forestry Department in protective work.

Our actual work of prevention consists briefly of looking after the railroad right away, cleaning up and burning where there is material that is a fire trap. Burning around saw-mills, utilize the telephone connections in our communities, in securing aid when fire does occur. Organizing fire fighting crews, warning those that were permitting anything that might cause a fire. Many different devices of prevention can be worked out that are unique to each community. Much good has been accomplished by causing the owners of small farms in the mountains to realize that those owning the large holdings that surround their farms are taking an interest in the protection of their own lands.

In this way we can assure men pay if they fight a fire just as soon as they see it, and confine it to as small an area as possible, and no pay if they do as their custom in the past has been, back fire from their own lands to protect themselves from the fire just as soon as the fire is anywhere within miles of their farm buildings.

In this way we have secured the hearty co-operation through appealing to the settlers self-interest. When a group of land owners spend hundreds of dollars, for the protection of their lands along practical lines, there necessarily is an uplifting influence exerted over the entire community, and with a practical system whereby we can actually show results. We have certainly done much in being a living example to our State. Due to favorable weather conditions, we were very successful this fall having only one or two four or five-acre fires. In the spring we had many fires and much good work was done. Some of them were caught in their incipient stage before much damage was done.

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